THE DENTAL PRACTITIONER

Journal of Dental Science for the Practitioner

VOL. V, NO. 4 DECEMBER, 1954

[*Incorporating the Proceedings of the British Society of Periodontology, and the Transactions of the British Society for the Study of Orthodontics*]

CONTENTS

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THE DENTAL PRACTITIONER

A Journal of Dental Science for the Practitioner

(Incorporating the Proceedings of the British Society of Periodontology, and the Transactions of the British Society for the Study of Orthodontics)

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THE

DENTAL PRACTITIONER

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EDITORIAL

FULL DENTURES

THE total loss of teeth can have important effects on a patient, both from a physiological and psychological viewpoint. Without the natural teeth and with no substitute, the appearance changes, the speech changes, the diet changes, to mention just a few radical departures from normal. These are fundamental changes in the habits and social life of a person, and adjustment without dentures is not always possible. To these people the provision of satisfactory dentures is essential; it is a prerequisite for a return to normal living. The treatment of these patients becomes of paramount importance, and the profession performs a service to the community in this respect; a service, however, which the community tends to take for granted, ignoring the skill and patience that go into the making and fitting of full upper and lower dentures.

Every man is entitled to his own beliefs and has his method of procedure in this type of treatment, but whatever procedure is adopted the basic fundamental principles underlying the work are the same. The technique must be guided by biological, mechanical, and æsthetic principles. It is not enough to make a case in which the æsthetic factor is uppermost, to the detriment of the other factors. A denture, however beautifully constructed and however great its æsthetic appeal, is quite useless if it falls down every time the patient opens his mouth. This artificial aid will finish up in the dustbin; it is only fit to be put under a glass case next to the sandwiches which it cannot masticate. Æsthetics may be the main idea in the patient's mind, but this should not be so as far as the dental surgeon is concerned. He has to make a biomechanical functional appliance and æsthetics must be subordinated to this main theme. It is of far greater importance to take a correct registration and ensure an accurate impression than to spend time on the contouring and the lustre of the finished article, and to take the infinite care that is essential in this painstaking task. There is proportion in all things, and in dentistry the order of importance is: Biological; Mechanical; Æsthetic. It is easy to get things out of proportion and to increase one to the detriment of another. It must nevertheless be avoided as otherwise such action invariably leads to failure.

The Editors take this opportunity of wishing all readers of THE DENTAL PRACTITIONER a happy Christmas and increasing good fortune in the New Year.

IMPRESSION METHOD FOR DENTURES KEPT IN POSITION BY ADHESION*

By **F. R. MUNZ**, D.M.D.

To make and insert dentures which are satisfactory in functional and cosmetic respects is a very complicated and highly skilled work. The more years one spends on research on the many details which have important bearings on prosthetic dentistry, the more one appreciates the many details and sciences the knowledge of which is necessary to master the problem. Anatomy, physiology, mechanics, and an intimate knowledge of dental materials are only some of the pillars which have to support our special subject. Without this intimate knowledge the making of a denture would remain a craft incapable of achieving the highest possible results or even satisfactory ones.

It is impossible to take good impressions without knowing the minute anatomical details of the mouth, because without this knowledge one cannot know what must be impressed.

The taking of the bite presumes an accurate knowledge of the physiology of the mouth, which is, of course, equally important for the articulation. Here mechanics are added to the many physiological problems.

The right shaping of the polished surface of a denture is only possible when the movements of the muscles of the lips, cheeks, and tongue are fully understood and taken into account. That, incidentally, is one of the main reasons why so few mechanics are really capable of making satisfactory dentures. If one is not in a position to explain and show the mechanic how to make the kind of denture required, inferior work will always result.

We will restrict ourselves in this paper to the taking of impressions by a method which I have developed during the last five years.

The most satisfactory description of the method may be achieved by giving first a very brief historical survey of the development of the impression technique and then making a comparison with other methods.

Up to about 1924 the usual impression material for full and partial dentures was plaster-of-Paris or compound. The size of the resulting denture was more or less dictated by the artistic feelings of the mechanic. The anatomy and physiology of the mouth was not understood fully enough to attempt the fixation of a full upper denture in any way other than by using a suction chamber. It was usual to connect full upper and lower dentures by springs. In our electronic age these springs are replaced by magnetic molars of equal polarity, apparently invented by and for dentists still at the same level of knowledge as at the beginning of this century. To keep full lower dentures in position increase of weight was the method commonly applied.

About 1924 we learnt from the U.S.A. to take the so-called functional impression for full dentures. In short, the guiding idea of this method is to take care that no muscle attachments of the cheeks, lips, and tongue and floor of the mouth to the alveolar ridge or jaws should interfere with the denture, and that the upper denture should be held in place by atmospheric pressure. This demand can be fulfilled when an individual tray is made for each case and is adapted in the mouth in such a way that movements of the corresponding muscles cannot dislodge the tray. The border of the upper denture is placed along the line in the vestibulum, where the tissue is immovable and most resilient, in order to allow additional pressure. The posterior border runs along the so-called vibration line which is situated on the transition of the hard to the soft palate and also allows additional pressure without the denture being dislodged by movements of the soft palate. During the years up to about 1940 some variations in the impression technique were published of

* Being the substance of a lecture given at The Turner Dental School, Manchester University, on March 24, 1954.

varying importance. They dealt either with the impression materials or with the way to make the individual tray. Some contributions concerning the anatomical conditions were important, but it was only when Edwards and Boucher in 1942, and Boucher in 1943 and 1944 published their studies on the anatomy of the mouth in relation to full dentures that the problem was fully explored and explained.

The question may be asked how far the functional impression fulfilled our aims. There is no doubt that full lower dentures, made according to this method, are not dislodged by the muscles concerned and that upper dentures are also kept in place by atmospheric pressure. As far as the shaping and positioning of the border of the dentures are concerned the impression might rightfully be called "functional". But no other part of the impression area is functionally impressed. It is left to the viscosity of the material used for the impression to determine the degree of pressure, if any, which can be exerted on the tissue, but there is no way of taking into account the different resilience of the various parts of the impression area. This shortcoming is acutely felt by most research workers in this field with the result that, when using the various impression materials and techniques, many recommendations are made for relieving hard areas by either tinfoiling the model or scraping the impression.

Apart from this obvious shortcoming of the "functional" impression, experience has shown that the excellent suction, which is so remarkable when the upper dentures are inserted for the first time, diminishes later and may even be lost altogether. Witnesses of such an unpleasant experience are the many methods of border corrections or relinings which have been published and which have to be put into practice.

The reason why the valve-washer-like border deteriorates in its function is that any tissue exposed to continuous pressure is bound to suffer resorption, and if a new border correction with new pressure is made to remedy the lost suction the old trouble only recurs.

With the development of the impression method, using perspex trays, I suggest that the main faults and shortcomings of functional impressions have been overcome without adding any special difficulties. It would be hypocritical if I said that right from the beginning I was out to replace the functional impression, and the retention of the upper denture held in position by suction, by an adhesion impression. At the beginning I was only searching for a material which would facilitate the making of individual trays. One of the materials I tried was perspex. Slowly I found more and more important properties in this material for a new impression method. With the technique the theory could be slowly developed, one promoting the other. The development was necessarily slow, because in private practice failures cannot be risked.

But I am now in the position to give you first the theory of the adhesion impression. Adhesion means molecular attraction of two different substances. They can be stuck together when their surfaces are in very close contact. The adhesion is raised if a fluid film between the two substances is very thin and of equal thickness throughout. Such conditions can be achieved in the mouth if our impression allows for the varying resilience of the different areas.

I should mention now a paper published by Campbell in January of this year (1954). He made two sets of base-plates, one with a zinc-oxide–eugenol wash impression, the other with an alginate impression, dried the mouth as much as possible by massive doses of atropine, and measured the forces necessary to dislodge the plates. After giving an explanation of adhesion in his introduction, he cites Staniz's formula:—

$$F = \frac{2CA}{a}$$

when F is the force, C the coefficient of surface tension, A the area of the plate, and a the thickness of the fluid film, and in the end he comes to the conclusion that: "The absence of the normal layer of fluid between the denture base and the palate does not in any way lessen the retention of the denture. The increase in retention of a denture base without the usual fluid film cannot be explained on the basis of accepted theories." In fact, the explanation

is very simple when we read the above formula correctly. The thinner the fluid film, the greater is the force of adhesion. When there is room for a thick film, not only is the adhesion lessened, but also a thick film has almost the effect of oiling, and will promote dislodgement. These physical facts should be kept in mind by those who advocate the use of so-called suction chambers. The perspex adhesion impression method attempts to make the layer of fluid between denture and denture-bearing area as evenly thin as possible.

If we can rely on adhesion to keep our dentures in place, we can, at the same time, dispense with the size of the dentures as far as former rules necessitated having the borders in softer areas which allowed additional pressure. The lack of additional pressure in any area is, as I have mentioned before, a physiological advantage as well. It is also unnecessary to cover the entire hard palate posteriorly down to the vibration line. The covered area is big enough if the denture is of a horseshoe shape and a great part of the hard palate is left free. The advantage to the patient of such a horseshoe-shaped denture is considerable, because the patient no longer feels the denture to be such a large foreign body, and taste is less affected. As we know, the sense of temperature is to a large extent situated in the hard palate and very often it takes a considerable time for a patient having been fitted with a denture covering up the whole hard palate to adapt himself to the very changed conditions. Of course, we should not make the denture too small, first because the adhesion is also a function of the size, and secondly because the area of a tissue-borne denture must be big enough to take the pressure of mastication without causing pain or, eventually, resorption. The size and shape of the labio-buccal flange of the upper denture is determined by the muscle attachments of lip and cheeks to the alveolar rim, and cosmetic exigencies. I have calculated the areas covered by a functional impression and by an adhesion impression, and have found that my horseshoe-shaped denture covers, on an average, about 10–15 per cent less area than a classical functional denture.

As for the lower dentures, the impression surface is in any case small and has to be used to the fullest possibilities. The size of my lower denture is the same as that described by Boucher for functional impressions. In short, the muscle attachments of lip, cheeks, floor of the mouth, and tongue determine the extension of the denture.

TECHNIQUE

The impression method can be described very simply now that we have considered the theoretical principles.

Before the preliminary impressions are taken, we have to make sure that no surgical preparations of the alveolar rims or jaws have to be made beforehand. Wherever there are dubious areas, X-rays should be taken. Many dentures are failures because such self-evident precautions were not taken in time.

I take the preliminary impressions usually with Zelex, but any other hydrocolloid or alginate, or plaster-of-Paris, is suitable. It is important that all landmarks of the denture area are included and that the impression is removed with the least possible distortion. From these impressions we cast the anatomical models. With pink modelling wax the tray is modelled on this cast, care being taken that the wax is adapted very closely to the cast. No handle whatsoever is made and the wax tray should be of the same thickness all over as far as possible. The cast with the wax tray is now enflasked, a counter is cast, and, after the plaster-of-Paris has set, the wax tray is washed out. A blank piece of perspex, $\frac{1}{16}$ in. thick, about the size of a base-plate, as sold commercially, is heated in an oven or on a thick asbestos sheet to about 140° C., when it will be soft. With a piece of cloth material, the perspex blank is adapted by hand pressure to the model as closely as possible and kept in position until it has cooled and hardened. Gross excess of the perspex is cut off with a steel carborundum disk. The perspex tray is now placed in the flask between two cellophane sheets and the flask heated to 165° C. It can be brought up to this temperature in an oven with dry heat; it is important not to exceed 165° C., otherwise bubbles will appear in the perspex or it may

become cloudy. The flask is now tightly closed under the press and allowed to cool. Then the tray can be taken out of the flask. It will fit tightly to the cast and will be glass clear. Obvious excess is cut off. No polishing of the tray is necessary.

The tray is now ready for adaption in the mouth. This is the most important stage of the whole method. The transparency of the perspex makes the adaption easy, because every step can be controlled by the eye. The tray is seated in the mouth and then kept in place by the assistant. First, the extension of the labio-buccal flanges are fixed. By pulling the upper lip and cheek down and outwards, the heights of the flanges, the side and insertion of the frænum labii superioris and buccinator attachment can easily be seen and marked on the tray with a wax pencil. The tray is cut out accordingly and examined in the mouth for its fit; any adjustments regarding the heights of the flanges are made where necessary.

Fig. 1.—After the tray has been cut to its appropriate size, the areas which have to be relieved are marked with a wax pencil.

The posterior border of the tray is in the pterygomaxillary notch; from there the posterior border of the adhesion impression differs from the classical position. On both sides it runs parallel to the rims in the soft tissue of the palatinal glands so near to the median line that the posterior palatine foramina are well within the tray. The hard palate is crossed roughly at the posterior end of the area of the rugæ. Here the tissue is usually relatively softer. This course is palpated by a blunt instrument and marked with an indelible pencil. The tray is seated, and the marked line transferred to the tray by tracing it with the wax pencil. The tray is cut out accordingly (*Fig.* 1).

When the tray is now brought back into position and pressed against the jaw several ischæmic areas can be observed, a sign of the varying resilience of the mucous membrane in different areas. There are typical places of lesser resilience. First, there are always a number of areas on the rims where uneven resorption of the bone has left spots which are covered with a thinner mucous membrane. The area of the upper tuberosity has also a lesser resilience. All ischæmic areas are marked with the wax pencil on the tray and it is ground out for relieving accordingly (*Fig.* 2). For the incisal papilla, for the rugæ, and the posterior palatine foramina grinding out of the tray must be made to achieve the necessary relief. The adaption of the tray can only be regarded as complete if the seated tray produces an evenly pale pink mucous membrane. It goes without saying that the adaption takes the longest time of the impression, about 10–15 minutes, but it is simple because the progress can be observed and the spots which still need relieving can be marked each time. The border of the tray is now rounded off with a small amount of red Kerr compound, making a border about the thickness of a matchstick (*Fig.* 3). Active and

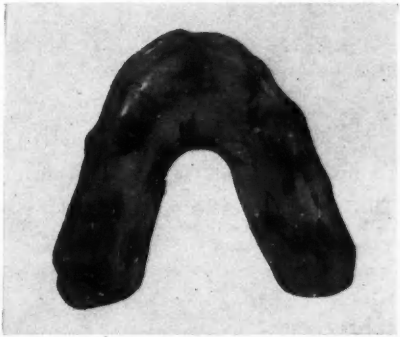

Fig. 2.—Surface of the tray facing mucous membrane. The relieving has been carried out.

passive movements of the lip and cheeks are made to mould this border. In the region of the buccal vestibule lateral from the maxillary tuberosity, some more red Kerr compound is added on the outside of the tray to obtain an impression of the buccal vestibule. This space, when properly filled out by the denture, is important for its stabilization. To mould the Kerr compound in this area, the patient is asked to open the mouth and to move the lower jaw towards both sides. When the functional borderline impression is finished the impression side of the tray is covered with a fairly thin layer of zinc-oxide–eugenol paste (*Fig.* 4). The tray is seated with firm pressure and while the paste is beginning to set, active and passive movements of the lip and cheeks are made to press away any overflown paste. On the palate, any paste which has overflowed is removed with a filling instrument.

The size of my lower dentures follows the description Boucher gave in his classical papers. The advantage of using the perspex method is that the transparent tray, which has been made to fit the anatomical cast, makes it easy to form the functional border line. The intricate insertion of the lingual frænum, and the genioglossus and mylohyoid muscles on the lingual side of the mandible can easily be observed under the seated tray, and the tray can be cut correspondingly. It should be kept in mind that the impression must cover the whole area which can be used to support and stabilize the denture, but it should not include any parts of the mouth which would nullify our endeavour by their movements. When the

Fig. 3.—The border of the tray has been functionally formed with red compound.

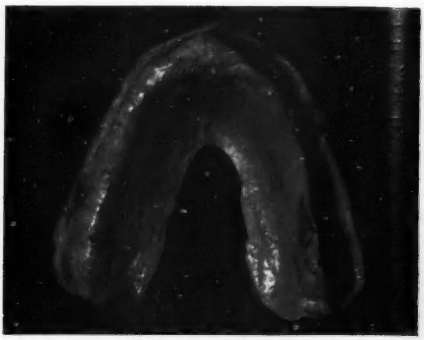

Fig. 4.—Zinc-oxide–eugenol paste wash impression.

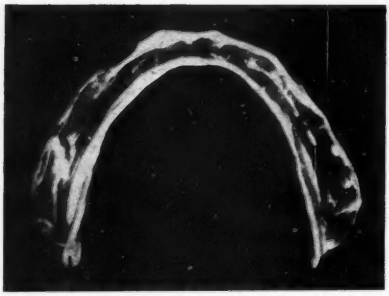

Fig. 5.—The size of the tray has been determined in the mouth and the necessary relieving has been made.

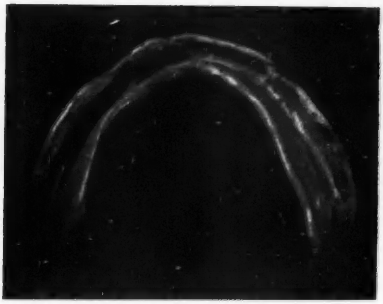

Fig. 6.—After the red compound border has been formed functionally, the final zinc-oxide–eugenol paste wash impression has been taken.

functional shaping of the impression is finished the impression has the correct outline of the future denture, and so no arbitrary marking of the periphery is allowed. After the perspex tray is cut to its functionally fixed size, the areas which need relieving are marked on the tray with the wax pencil. The mylohyoidea line, which is the thin mucous membrane covering the mylohyoid ridge and the lingual tuberosity, must always be relieved (*Fig.* 5). Care should be taken, that the retromolar pad is not exposed to hard pressure. It may also be necessary to relieve the mental foramen if it is in the denture area by extensive resorption of the ridge. Any less resilient spots on the alveolar ridge are also relieved at the corresponding places on the tray. These areas can be found easily and quickly because they appear ischæmic under pressure of the seated tray.

Fig. 7.—Final upper cast.

Fig. 8.—Final lower cast.

When the tray fits evenly, the border correction is made with a little Kerr compound by active and passive movements of the lip and cheeks and active movements of the tongue. Care must be taken that no compound flows into the tray, especially in any of the relieved parts. Should this happen the compound is cut out with a knife. Only the retromylohyoid eminence has sometimes to be built up in the mouth with red or green Kerr compound if it was impossible to press the perspex on the cast tightly into these undercuts.

The impression is finished with a zinc-oxide–eugenol paste wash impression (*Fig.* 6). The impression should now show definite adhesion and should resist removal or displacement. The adhesion is of course less than in the upper jaw because the covered area of a lower denture is only about two-thirds or one-half the size of an upper denture and adhesion is a function of the size.

The casts are made from the finished impression without any boxing in. This is unnecessary because when the borders of the impressions are immersed in the stone, the periphery of the impression outlines itself automatically and there should be no difficulty in removing the impression from the model after it has been placed for a little while in hot water. It is important that the model should show the course of the buccal vestibulum and the alveolar-lingual sulcus. I have to admit that I cast and make the models myself, and do not give the impressions to the mechanic (*Figs.* 7–12).

The perspex impression method is of great importance for partial dentures as well. It can be used to advantage for partial adhesion dentures or metal skeleton dentures. Partial upper dentures can then be made without clasps, and will of course then be fully tissue borne. The possibility of leaving out clasps has the advantage that the remaining teeth are not so much endangered by decay. Upper partials cover a large enough area to allow them to be made as adhesion dentures. For skeleton metal dentures the advantage of the perspex impression method lies in the proper

reproduction of the tissue under pressure, and the danger that a bar might ride on a harder area is excluded.

The method is adapted to partial impressions as follows:—

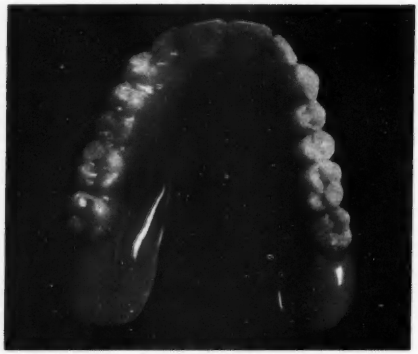

Fig. 9.—Occlusal view from the upper denture.

Fig. 10.—Tissue side of upper denture.

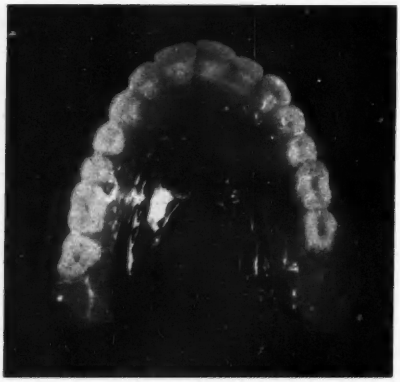

Fig. 11.—Another upper horseshoe-shaped denture with a metal base. It has even better adhesion than an all-plastic denture.

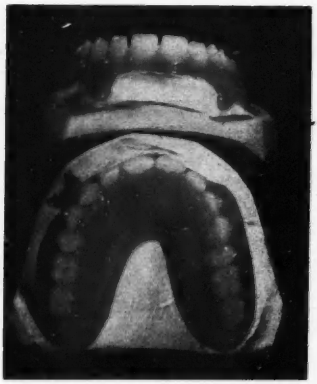

Fig. 12.—For cosmetic reasons the labial flange from $\frac{3}{3}$ had to be cut out. There is no appreciable loss of adhesion.

An anatomical impression with Zelex is first taken and a model cast from it. On the model the remaining teeth are cut away so that only a small stump of about 1 mm. in height is left standing. A tray is made similar to that for a full denture. After the pressed tray is taken out of the flask, the position and shape of the remaining teeth can easily be seen and the tray is cut at these points accordingly. The tray is now adapted in the mouth. First it is cut to the appropriate size and then all necessary relieving is carried out, special care being given to relieving the torus palatinus (*Fig.* 13).

Then a border correction is made all around with very little red Kerr compound (*Fig.* 14), and thereafter a zinc-oxide–eugenol paste wash impression is taken. This impression comprises, therefore, only the area of the jaw which can be used to support the partial dentures (*Fig.* 15). When the wash impression has set, the impression should stay firmly in the mouth. To add the remaining teeth a Zelex impression is taken with a stock tray over the perspex tray. When the Zelex

impression is taken out of the mouth (*Fig.* 16), the perspex impression will be firmly imbedded in it and no transition from the zinc-oxide–eugenol paste to the Zelex should be seen. A

Fig. 13.—The size of the tray for the partial denture has been determined in the mouth and the necessary relieving has been made.

stone model is now cast. When the impression is removed from the model the area of the perspex impression can easily be recognized because the zinc-oxide–eugenol paste gives a slight pinkish colour to the stone. It is important to mark this area with a pencil

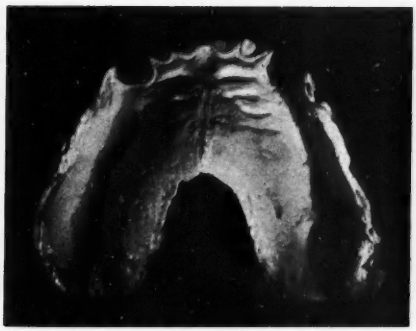

Fig. 15.—The zinc-oxide–eugenol wash impression for the partial adhesion denture.

because this colour can, and should, be washed off (*Fig.* 17).

As for adhesion partial dentures, the finishing of the plastic dentures does not differ from the usual way except that no clasps are attached and, of course, the size of the denture is fixed by the adhesion impression (*Fig.* 18).

For skeleton metal dentures the original model is used as a master model; all clasps, retainers, and the denture itself are modelled on the duplicate working model. The clinical

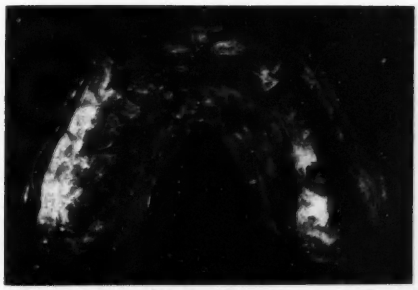

Fig. 14.—The border has been functionally formed with red compound.

results of this method may be summarized as follows: It takes hardly any more time to take an impression with my method than it does with an individual tray made from any material for taking the classical, so-called

Fig. 16.—The final Zelex impression over the partial adhesion impression has been taken to get a complete impression of the jaw.

functional impression. The outlining of the periphery of the tray is achieved more quickly with the perspex tray because the muscle attachments can be seen so easily. The additional time spent relieving the tray until it fits perfectly, the phase which I regard as the most important one, pays its dividends

later, when hardly any "eases" are necessary, after the dentures have been inserted.

Provided that bite and articulation do not need any adjustments, it is very seldom that the patient has to return for easing resulting from sore spots. Usually I have to inquire by 'phone how the patient is getting on because he does not return!

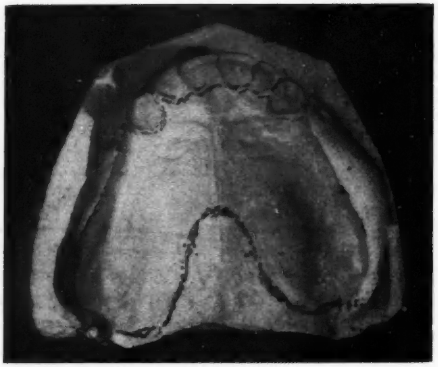

Fig. 17.—The final cast for an upper partial adhesion denture. The outline of it is marked with a pencil.

Up till now I have not seen a broken adhesion denture, if I disregard the case of one man who tried to crack a nut with his dentures, because, and these were his own words, "I absolutely forgot that I have dentures"!

The reason for the absence of fractures, especially those typical ones in the middle line, is, in my opinion, mainly due to the fact that the denture is evenly supported by the whole denture-bearing area. But in fairness I should say that X-ray diagnosis, surgical preparation of the jaw, and strict adherence to the rule of not placing the artificial teeth outside the alveolar rim, may be also responsible for the absence of fractures. My experience with partial upper adhesion dentures is certainly very encouraging. However, the number of cases I have made up till now is still too small to allow the generalization that clasps are no longer necessary for all partial dentures. For lower partial dentures the use of clasps for fixation cannot be dispensed with because the area covered by such dentures is too small to secure a good adhesion.

There is, I must point out, still one difficulty left which has not yet been satisfactorily mastered. My *impressions*, without exception, have perfect adhesion, but not all the resulting *dentures* have this same standard of adhesion; this means that their dislodgement definitely needs less force. Here is a fault which can only be sought in the warpage or shrinkage of the denture material which occurs during processing. Very careful processing is one way of diminishing this fault, but the ultimate solution may be found in the development of either a different copolymer plastic, or, more likely, in a compensating investment.

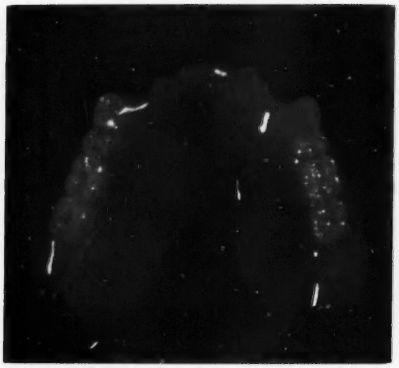

Fig. 18.—Partial upper adhesion denture. Note that no clasps are used for retention.

That, of course, is far beyond the ability of a dental practitioner such as I, but I hope that Professor Matthews, with his keen interest in such questions, together with the wonderful facilities of this dental school, will succeed in solving this important problem.

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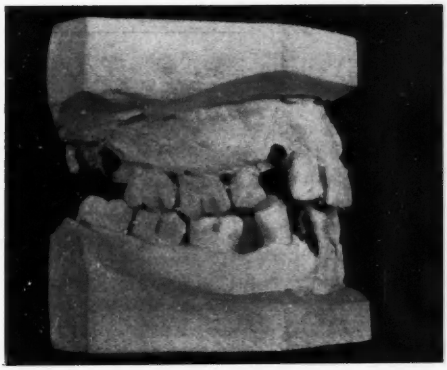
IDENTIFICATION REQUIRED

THE body of a female aged about 21 years, about 5 ft. 1 in. in height, rather plump and with partially bleached brown hair, was recovered from the sea at Blackpool on July 22, 1954. Death appeared to have taken place three to six months previously. The body was in an advanced state of decomposition. The identity of the deceased girl has not yet been established and it is the hope of the Coroner, W. Blackhurst, Esq., and of the Chief Constable of Blackpool that the dental condition may be of help in this connexion.



The jaws are those of a normally developed female. There is some asymmetry of the mandible, the right horizontal ramus being somewhat compressed. Teeth present during life were:—

$$\frac{87653\ 21|1245\ 78}{87643\ 21|12\ \ 5678}$$

X-ray does not reveal any buried teeth, but the X-ray appearance of $\lfloor 6$ area would suggest the extraction of this tooth about 12–18 months before death. The teeth present in the skull when the body was recovered were:—

$$\frac{8765\ 21|\ 24}{8764\ 2\ |1\ \ \ 678}\ \underline{8|}$$ is grossly carious.

No conservation work has been done. The girl may have sought advice about a pericoronitis affecting $\lfloor 8$, which may have caused some swelling of the left mandible. At an early age treatment for overcrowding has been carried out by the removal of:—

$$\frac{4\ |\ 3}{5\ |\ \ }$$

and possibly $\lfloor 3$ and/or $\lfloor 4$. It will be seen that $\lfloor 2$ and $\lfloor 4$ approximate, also $\underline{3|}$ and $\underline{5|}$, and $\underline{4|}$ and $\underline{6|}$, the spaces left by the extracted teeth having been obliterated. The maxillary incisors are regular and have a large overlap on the mandibular incisors, suggesting some prominence of the maxillary incisors. $\overline{1}|$ appears to have been somewhat labially displaced.

Salivary calculus is present on the lower incisors, whilst the appearance of the alveolus of the mandible and maxilla is suggestive of a chronic gingivitis. This could be consistent with the irregularity of the lower incisors and prominence of upper incisors.

Any practitioner who may have treated a patient to whom the above details apply is asked to communicate with the Chief Constable of Blackpool.

A SYMPOSIUM ON CLEFT PALATE

IV. SECONDARY SURGICAL PROCEDURES FOR THE CORRECTION OF DEFORMITY IN THE CLEFT LIP AND PALATE PATIENT*

By **N. L. ROWE**, F.D.S. R.C.S. (Eng.), L.R.C.P., M.R.C.S., L.M.S.S.A., H.D.D. R.C.S. (Edin.)

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THE AETIOLOGY OF SECONDARY DEFORMITY

The deviation from normal which may be observed in an adult patient suffering from the defect of a cleft lip and/or palate which has been repaired in infancy will range from a minor variation in the contour and shape of the nose and upper lip with an insignificant alteration in the appearance and efficiency of the dentition, to a degree of deformity which can only be described as a mutilation.

The more severe examples are observed in those patients who have been subjected to operation by the relatively more traumatic techniques evolved during the latter part of the nineteenth century and the early part of the present century, but it is a matter for some regret that even to-day, employing improved and comparatively atraumatic procedures, many of the older patients originally born with a cleft lip and palate manifest a severe degree of interference in the normal growth and development of the facial skeleton.

It is not the purpose of this paper to consider the exact nature of the aetiology of such a deformity, but it is the author's contention that the original defect in utero is limited to a primary failure of mesenchymal growth and differentiation at approximately the sixth week of intra-uterine development which secondarily results in a breakdown of epithelial continuity, with a consequent establishment of a cleft, either in the lip or palate, or in both regions. This gap is subsequently widened by muscular pull assisted by tongue thrust, but the primary deformity is essentially limited to a variable degree of mesenchymal aplasia which persists for a relatively brief period of intra-uterine time. Thereafter, the parts continue to differentiate and grow at a normal rate and in a normal manner *unless they are subsequently interfered with by surgery*, so that the adult manifestation of an untreated cleft lip and palate will faithfully reproduce those conditions observed at birth when little or no interference can be detected in the relative proportions of the facial skeleton.

Whilst it is appreciated that closure of the lip at an early age is essential for social and psychological reasons, it is felt that palatal closure should be deferred until five years of age or later in order to minimize interference with the growth and development of the facial skeleton. It is therefore the author's desire to stress that the majority of secondary deformities are not in any way due to the original genetic defect, but are wholly or partially brought about by surgical intervention which may in some cases be both unavoidable and desirable, but may in other instances be a reflection upon the technique employed, and the timing of the operation in relation to skeletal growth and development.

SURGICAL PROCEDURES EMPLOYED IN THE CORRECTION OF THE SECONDARY DEFORMITY

The various methods employed for camouflaging or correcting the secondary deformities which become manifest in the cleft lip and palate patient during adolescence or early adult life may conveniently be considered in relation to six basic techniques:—

1. *The surgical revision* of existing tissues.

* Being Part IV (March) of a symposium on Cleft Palate given at the February and March meetings of the British Society for the Study of Orthodontics.

2. *Onlays*, inserted between the bone and the overlying tissues. These are preferably derived from autogenous sources and consist of bone from the iliac crest or occasionally the olecranon process, or cartilage derived from the costochondral region of the eighth or ninth rib.

Homografts of preserved bone or cartilage, kept in merthiolate or a "deep-freeze", and derived from living or cadaver sources, may occasionally be employed. Heterografts of preserved bovine cartilage are also used or occasionally allelografts of polythene or terylene, but these latter substances are, to some extent, still in the experimental stage.

3. *Inlays* of epithelium obtained from autogenous split skin such as the Thiersch graft are frequently utilized to create a pocket for the insertion of a suitably shaped prosthesis by means of which the contour may be restored.

4. *The Abbé flap*: This technique employs a local rotation flap of full thickness from the lower lip which is used to fill a reconstituted defect in the upper lip.

5. *Maxillary osteotomy and bone-graft.*

6. *Tube pedicle repair of the palate*: This technique makes use of tissue imported from a distant source to close the defect in the palate. The procedure may or may not be performed in association with osteotomy of one or both maxillæ.

The last three techniques which have been enumerated are concerned with a fundamental principle of reconstructive surgery—placing back into normal position those structures which are normal, and transporting tissue from elsewhere to fill the original defect thus re-created.

1. The Surgical Revision of Existing Tissues.—This may be confined to the nasal and labial tissues, or the oral tissues, or surgical re-adjustment may be called for in both regions.

There is almost invariably some degree of lateral deviation of the premaxilla, anterior nasal spine, and base of the columella in the original deformity, and persistence of this abnormality frequently calls for repositioning of the alar base, narrowing of the nasal vestibule, and improvement in the contour of the nostril margins. Failure of downward and forward projection of the middle third of the facial skeleton will result in a disparity of growth between the upper and lower parts of the nose, so that the tip is commonly drooping and retroposed in addition to being deviated to one side. This appearance may be very considerably improved in most cases by submucous resection of the nasal septum, reduction of the prominent hump on the dorsum of the nose, and shortening of the septal cartilage comprising the nasal tip. In the case of a patient born with a bilateral cleft of the lip and palate there is an inherent shortage of tissue in the region of the columella, and it is usually necessary to lengthen this at some time subsequently by means of a V–Y advancement of tissue from the adjacent area of the upper lip. Lips which have been closed by some of the earlier techniques frequently appear either too short or too long, often with irregularity of the mucosal margins on each side of the line of junction of the two portions of the upper lip. Scar excision and re-adjustment of the level are then called for, and construction of the normal "cupid's-bow" may be effected by advancement of mucosa from the inner aspect of the lip.

Intra-orally, secondary surgical procedures are primarily directed towards the restoration of function. Minor oro-nasal fistulæ can usually be closed by means of local flaps of muco-periosteum from the palate. Gross shortage of tissue in the soft palate is often encountered, and it is not always appreciated that this occurs both in an anteroposterior and transverse direction, the previous attempt or attempts at closure having resulted in the formation of a considerable amount of residual scar tissue.

The edge of the soft palate is therefore some distance from the posterior pharyngeal wall, and in most instances repositioning cannot be attempted except by a bodily translation of the entire soft palate. Two principal procedures are used for this purpose, the Dorrance "push-back" operation, and the Gillies-Fry technique.

In the *Dorrance operation*, an extensive incision is made, starting on the palatal

aspect of one maxillary tuberosity and proceeding a few millimetres from the palatal aspect of the teeth, extending to a similar point on the opposite side of the upper jaw. The entire mucosa of the hard palate can then be elevated and the raw surface covered with a Thiersch graft. The flap is returned and pressure applied for a few days until the graft has taken. Three weeks later the flap, with its now epithelialized under-surface, is again raised, the attachment of the aponeurosis and nasal mucosa at the posterior edge of the palatine bones freed, and the entire soft palate displaced posteriorly, to be attached by its anterior margin to the posterior edge of the palatine bones.

The *Gillies-Fry procedure* divides the palatal mucosa, muscles of the soft palate, and nasal mucosa at the junction of the velum with the mucosa of the hard palate. This enables the soft palate to be displaced posteriorly as in the Dorrance procedure, but leaves a defect between the hard and soft palates which must be closed by an obturator.

Stenosis of the defect, with consequent retraction of the retroposed soft palate, is prevented by grafting the raw margins with a Thiersch graft.

Surgical procedures have also been devised by Wardill and Hynes in an attempt to build up a cushion or pronounced form of Passavant's ridge on the posterior pharyngeal wall, a technique known as pharyngoplasty, a manœuvre which is designed, like the Dorrance and Gillies-Fry operations, to assist oronasal closure.

2. Onlays.—Contracture of the maxillary arches, owing to their imprisonment in a vice of scar tissue, may in turn interfere with normal growth of the facial skeleton which is reflected to some extent in a flattening of the bony prominence of the cheek. Onlay grafts to the underlying zygomatic bone will effectively restore the contour in such cases, the bone, cartilage, or other substance being inserted for preference via an incision placed within the hair line in the region of the temporal fossa. Onlay grafts may also be employed to correct the contour of the nasal bridge line, being inserted through a split-columella or intranasal paramarginal incision, or utilized to bring forward the region of the columella base. In some cases, bone-graft onlays have been inserted into tube pedicles for the reconstruction of the alveolar ridge.

3. Inlays.—A frequent and possibly inevitable sequel to the primary operation for

Fig. 1.

Fig. 2.

Fig. 1.—Pre-operative profile, showing gross hypoplasia of the middle third of the face as a result of repeated attempts at palatal closure in infancy and early childhood.

Fig. 2.—Post-nasal epithelial inlay to permit insertion of prosthesis designed to bring forward the middle third of the facial tissues. The floor of the nasal cavity may be seen at the top of the picture.

the closure of a cleft lip and palate is the formation of a variable amount of scar tissue in the upper labial sulcus. In addition there is usually some interference in the forward projection of the premaxilla. Satisfactory restoration of the lip contour may only be possible after the scar tissue has been excised and the abnormal attachment of the lip thus freed so that it may be held forward by a prosthesis, whether this be designed to fit over the existing anterior teeth or to replace them following their removal.

The simple excision of scar tissue is almost invariably inadequate since the raw surfaces adhere and further fibrous tissue formation is thereby promoted, and for this reason the pocket left following the excision of the scar must be lined with a thin layer of epithelial tissue. This is inserted, draped over an accurately fitting mould of black gutta-percha, which is supported by a detachable tray secured to a splint. The mould is left in situ for approximately one week post-operatively, when the graft will have attached

Fig. 3.—Prosthesis and obturator employed in this case.

itself to the underlying tissues. It will be evident that the extent to which the soft tissues of the lip can be translated in a forward direction will be dependent upon the degree to which the epithelial-lined pocket can be opened or distended, a factor which in turn is related to its width. Having due regard to the pronounced contracture from which all inlays of this nature suffer, it will be necessary to make the incision from the first molar region on one side to a similar point on the other side if anything more than a minor degree of forward movement of the lip is to be achieved. In most instances the dissection should extend to the level of the anterior nasal spine, but the pocket cannot be extended much beyond this point in a superior direction without perforating the nasal mucosa and creating a permanent

Fig. 4.—Post-operative profile following insertion of bilateral onlay bone-grafts to the zygomatic bones, post-nasal inlay, insertion of prosthesis, nasal reduction, and bone-graft to dorsum of nose.

oronasal fistula. This procedure may have to be done deliberately in those cases of severe deformity where the entire central section of the middle third of the facial skeleton is underdeveloped (*Figs.* 1–4).

4. The Abbé Flap.—The defect in the lip resulting from the failure of embryonic fusion may vary considerably from an incomplete cleft or fissure to a wide gap involving the floor of the nostril on one or both sides. This shortage of tissue, which is an inherent element of the deformity, assisted to a variable extent by the scar-tissue formation consequent upon operation, acts as a tight restrictive band which effectively prevents the development of the normal basic pattern of skeletogenesis, particularly with regard to the dento-alveolar component of the middle third of the facial skeleton.

The mandible and tissues of the lower lip are not thus restricted and occupy a position which approximates to normal, although the the case. Any attempt at a lip seal results in the tight upper lip pressing on to the posterior aspect of the mucosal border of the

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 5.—Bilateral cleft lip and palate closed in infancy. *Fig.* 6.—Profile view.

Fig. 7.—Full-thickness flap from lower lip rotated into position in the upper lip, in which the original defect has been re-created.

Fig. 8.—Appearance five years later.

Fig. 9.—Note restoration of normal profile.

increased vertical depth of the unopposed lower alveolar segment tends to carry the lower lip level slightly higher than is usually lower lip, and the presence of an increased free-way space, which is an almost invariable accompaniment of such cases, together with

malposition of the incisor teeth, encourages forward thrust of the tongue against the lip during deglutition. The resultant drooping and eversion of the lower lip is further encouraged by the lack of muscular continuity of the orbicularis oris which is in consequence unable to exercise its normal sphincter action so that there is a lack of balance with over-activity of the fibres of the lower lip.

Fig. 10.—The continuous line indicates the level of division of the mucoperiosteum and the interrupted line, the level of division of the lateral wall of the maxillæ.

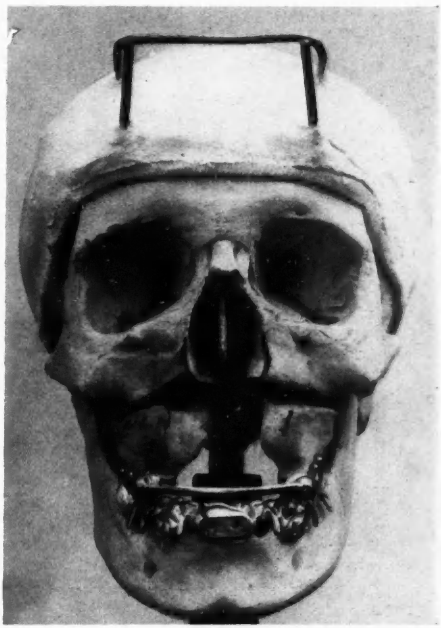

Fig. 11.—The maxillæ, after osteotomy, are placed into their correct lateral relationship with the mandible by attaching the locking plates and connecting bar.

The Abbé operation is a logical procedure designed to transpose a whole-thickness wedge of tissue from the lower lip into the upper lip after the original defect has been surgically reconstituted by excision of the scar.

The excellent vascularity of the facial region makes it possible for a V-shaped or W-shaped full-thickness flap of skin, muscle, and mucosa from the lower lip, the final division of which just stops short of the mucosal margin on one side so as to include the inferior labial artery, to be rotated on this remaining attachment through 180° into the re-created defect in the upper lip, where the various layers of tissue are meticulously sutured into position. There is a sufficient residual surplus of tissue in the lower lip in such cases to permit direct closure of the subsequent defect without undue tension or diminution in the oral vestibule. After fourteen days the circulation has become sufficiently established to allow the flap to be detached from the lower lip, when the margins may be finally trimmed.

Thus, in one procedure, the ugly eversion of the lower lip is corrected; the tension of the upper lip on the upper jaw relieved; and a restoration of soft tissue and muscular balance between the upper and lower lip obtained. Where such a procedure is clearly indicated it would seem to be reasonable and

advantageous for the operation to be carried out before undue restriction of maxillary growth occurs, although some degree of co-operation from the younger patient must be ensured, particularly during the intermediate stage. Interdental eyelet wiring is often a wise precaution during this phase of

Fig. 12.—Cancellous chip bone-grafts in position prior to closure of the mucoperiosteum. Craniomandibular fixation has been applied.

treatment to prevent opening of the jaws with consequent tearing apart of the tissues (*Figs.* 5–9).

5. Maxillary Osteotomy.—Although the provision of orthodontic treatment may largely counteract the less severely contracted types of arch deformity in the upper jaw, the extreme narrowing of the apical base encountered in many cases must render the future stability of the tooth position somewhat insecure; and in the adult patient there would seem to be little doubt that effective repositioning of the teeth or the maxillary segments as a whole cannot be achieved by this means.

Until recently there was little that could be offered such patients apart from a somewhat unstable type of prosthesis, but the original

Fig. 13.—Maxillary hypoplasia with associated contracture of the arch in a Veau III type of cleft lip and palate repaired in infancy.

work of Sir Harold Gillies in the field of maxillary osteotomy for the adult cleft-palate patient has enabled a different approach to be made to the problem. Experience in osteotomy

Fig. 14.—The dentition of the patient shown in *Fig.* 13 after maxillary osteotomy with forward translation of the right segment. Further improvement will be made by extracting $\underline{3}$ and constructing a partial denture.

of the upper jaw for various conditions arising from untreated injury to the middle third of the facial skeleton, and divers congenital deformities of the skull and facial bones, resulted in the application of the knowledge

gained in this way to the residual deformity of the arch in cases of cleft lip and palate.

The principles of the procedure consist essentially in sectioning of the lateral wall of the maxilla, fracture by instrumental leverage of the tuberosity, pterygoid laminæ of the sphenoid bone, and medial wall of the maxilla, jaws are one integral unit (*Fig.* 11) and this combined maxillary/mandibular block is then placed in its correct position in relation to the cranial base. This is achieved by pre-operative assessment of the resting position of the mandible, using the position of the anterior projecting bar from the lower splint in relation

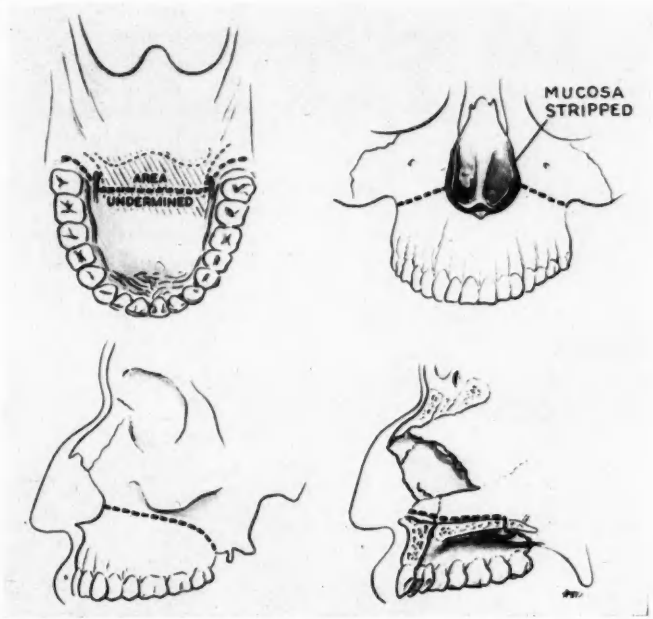

Fig. 15.—Maxillary osteotomy. Diagram illustrating the lines of section employed when an antero-posterior movement of the maxillæ is indicated. The division is suitably modified when only one maxilla is involved.

and reposition of the dento-alveolar component into a position of optimum occlusion with the lower teeth (*Fig.* 10). Fixation is provided by cast silver/copper alloy cap splints on both upper and lower jaws, the degree of separation of the maxillary segments being controlled by screwing into position a previously constructed connecting bar soldered between two locking plates, the width of the bar being determined beforehand by careful laboratory calculations with the aid of study models.

The maxillary splints, after fixation of the pre-arranged connecting bar, are secured to the lower splint by elastic bands so that both to the vertical rod employed for cranio-mandibular fixation to a plaster-of-Paris headcap as a point of reference; this being recognized at operation by small locating file-marks on the rod, projecting bar, and headcap framework.

When the connecting bar between the two halves of the upper jaw has been screwed into place, the maxillæ immobilized to the mandible, and the mandible in turn secured by universal joints to the headcap framework via the anterior projecting bar and vertical rod, a gap will have been defined between the upper and lower cut edges of the lateral walls of the

maxillæ. It is widely recognized that the freeway space in previously operated cleft-palate patients is greatly increased, and as a result of correction of this factor the gap ensuing after stabilization of the mandibular/maxillary component to the headcap is often appreciable. This must be filled with chips

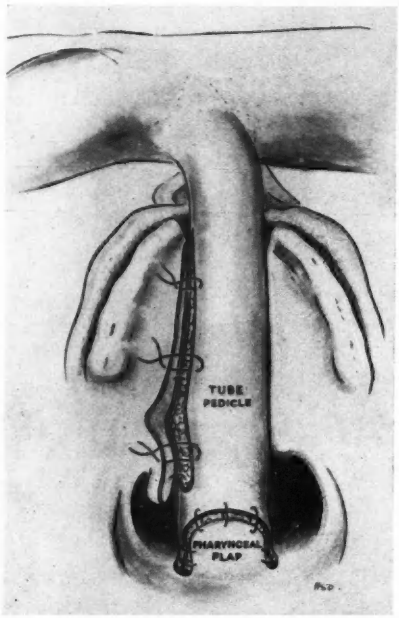

Fig. 16.—The tube pedicle, carried on the wrist, is attached to the flap on the posterior pharyngeal wall, and the margin of the palatal cleft.

of cancellous bone from the iliac crest if relapse is to be prevented post-operatively (*Fig.* 12).

Infection of the graft from the antrum is prevented by antibiotics aided by a good blood-supply from the mucoperiosteum. Craniomandibular fixation is maintained for four weeks, following which the headcap and maxillary/mandibular fixation is removed. The connecting bar between the two halves of the upper jaw is, however, retained for a further eight weeks, making three months in all.

The centripetal inclination of the lower teeth is a factor encouraging relapse of the fragments, and careful selective grinding of the buccal cusps of the lower posterior teeth is usually indicated, so that the axis of masticatory force may be directed through the vertical axes of the upper teeth.

It will be obvious that no movement can occur if one maxilla is attached to the nasal septum, but this greater fragment in many cases being the least affected by the contractile forces, does not usually require re-orientation.

However, should this be required the procedure is easily achieved by submucous division of the septum from the maxilla.

Anteroposterior movement of the entire upper jaw or part of the jaw can be performed, but besides the line of section previously described, transverse division of the palatine processes of the maxillæ in addition to division of the septum will be required, with special care being taken, as in all cases of maxillary osteotomy, to preserve the blood-supply through the palatine artery (*Figs.* 13–15).

6. Tube Pedicle Repair.—This procedure may be indicated under the following circumstances:—

a. As a complementary procedure for the repair of a lip and/or anterior palatal defect following maxillary osteotomy.

b. To close the defect between the hard and soft palates following the Gillies-Fry operation.

c. When the cleft in the hard and soft palates has not been previously closed surgically, and there is inadequate local palatal tissue, a tube pedicle may be inserted and attached to a flap dissected up from the posterior pharyngeal wall and the freshened margins of the palatal cleft (*Fig.* 16). Following detachment from its carrier, the pedicle then functions partly as a surgically constructed obturator of warm living tissue, and partly as a median raphé against which the lateral elements of the soft palate can approximate themselves and close the aperture of the nasopharynx, which is now divided into two separate channels on either side of the pharyngeal insertion of the pedicle.

Where the muscular action of the soft palate is seriously impeded by lateral tension from scar-tissue contracture and deficiency of

tissue, division in the midline can be performed, and a tube pedicle inserted on to the posterior pharyngeal wall between the lateral halves of the sectioned velum.

The tube pedicle itself may be raised from the acromiothoracic region, the abdomen, or the inner aspect of the upper arm, and transferred either directly, or via the wrist as an intermediate carrier, being inserted directly into the pharyngeal wall and one-half of the maxilla along the free margin of the cleft.

Fig. 17.—Tube pedicle repair of palate. The pedicle was originally inserted into the inner aspect of the upper lip and is here shown after detachment of the other end, which has been attached to the pharyngeal wall and margins of the palatal cleft.

The pedicle may also be inserted as an intermediate measure into the inner aspect of the lip (*Fig.* 17), or a reconstituted defect in the upper lip. Other routes have been described anteriorly through the nasolabial fold of the cheek by Schuchardt, or posteriorly just in front of the masseter muscle by Kitlowski.

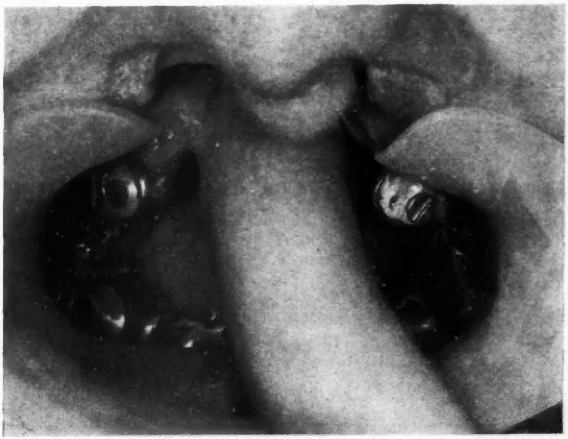

Fig. 18.—The tube pedicle, transported on the wrist, has in this case been inserted directly into the pharyngeal wall. Note the supporting lateral struts keeping the jaws apart, thus preventing trauma to the pedicle.

During the period of insertion of the tube pedicle, the jaws must be kept widely separated by lateral supporting struts to prevent any risk of trauma when the pedicle is gaining attachment to the tissues. If the operation has been preceded some months beforehand by a maxillary osteotomy, the same splints may be utilized, otherwise they must be specially constructed for the purpose (*Fig.* 18). Both before and after detachment of the pedicle from its intra-oral insertion, relief of gravitational pull should be afforded by a support attached to the upper splint, and finally some controlled degree of compression to the tissues of the mature pedicle will materially assist in improving the contour of the palatal vault (*Fig.* 19).

Fig. 19.—The same patient as shown in *Fig.* 18 after detachment of the pedicle and insertion into the upper lip. Note the point of attachment to the posterior pharyngeal wall.

In conclusion, it should be stressed that the best results in the majority of patients suffering from secondary deformities of the cleft lip and palate can only be obtained from the combined services of the plastic surgeon, oral surgeon, orthodontist, prosthodontist, and speech therapist working together as a combined team aided by the determined and intelligent application of the patient to his or her particular problem.

Acknowledgements.—The author is grateful to Sir Harold Gillies, C.B.E., F.R.C.S., for permission to include *Figs.* 5–9, which form part of the illustrations from his forthcoming book on plastic surgery, written in conjunction with Ralph Millard, M.D., and to be published by Littlebrown & Co., of Boston, U.S.A.

Figs. 17–19 are from cases performed in conjunction with Sir Harold Gillies, and *Figs.* 1–4 from a case in association with Mr. W. G. Holdsworth, F.R.C.S.

Figs. 13 and 14 relate to a case admitted under the care of Sir Harold Gillies and operated upon in conjunction with Mr. A. J. Evans, F.R.C.S.

Figs. 15 and 16 were drawn by Capt. H. Sibson Drury, Medical Artist to Rooksdown House, and the photographs were taken by Mr. E. Ferrill and Mr. R. Burn, of the Department of Medical Photography.

NEW MEMBER FOR SCOTTISH DENTAL ESTIMATES BOARD

THE Secretary of State has appointed Mr. M. N. Larkin, L.D.S., R.F.P.S., of Kilmarnock, to be a part-time member of the Scottish Dental Estimates Board in place of Mr. J. F. Henderson, who, having served continuously on the Board since it was established in July, 1948, found it necessary to resign his appointment as from October 31.

THE PROCEEDINGS OF THE BRITISH SOCIETY OF PERIODONTOLOGY

President: F. E. HOPPER, B.D.S., F.D.S. R.C.S.

Hon. Secretary: A. BRYAN WADE, B.Ch.D., F.D.S. R.C.S.,
The Royal Dental Hospital, Leicester Square, London, W.C.2

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RADIOLOGY IN PERIODONTAL PRACTICE*

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THE title chosen for this paper may be misleading in that it is not intended to go into certain aspects very minutely. Indeed, it would not be possible within the time available to cover this branch of periodontology thoroughly, and I shall only attempt to stress certain aspects which I feel have been neglected.

While a number of text-books of periodontology have appeared within recent years and are filling a long-felt want, the ultimate responsibility for raising the standard of periodontal practice must rest with the teachers in the subject. This responsibility entails a critical outlook, so that writings which tend to perpetuate inaccuracies can be assessed for their true worth.

This is particularly important when the literature on periodontal radiology is examined. It is found that certain fallacies occur again and again, so that the radiograph is credited with uses which it could not possibly have, or, again, the relative importance given to radiological or clinical examination is quite unbalanced.

Another point brought out by reviewing the literature is that advancement has often been more apparent than real. However, I feel that there are times when repetition is necessary, and can, in fact, be valuable so long as it is either eclectic or draws attention to work published long before the profession was ready to assimilate it.

The paper has been divided into three main sections: technique; limitations and value of radiographs; examination and interpretation.

TECHNIQUE

To obtain the full value from radiographic examination the following essentials at least must be fulfilled:—

1. An adequate number of films in a full mouth examination, that is, about 14 to 18.
2. A known angulation.
3. Periodic examinations using these known angulations, which will result in comparable serial studies.
4. Standard exposure, developing, and fixing.

It is in the realization of the third condition that so much difficulty has been found. There is need for a simple apparatus which will standardize the angulation used in any given case over a period of years. Apparatus of this type is not yet available in this country.

Reports have appeared in the literature at various times regarding the use of a paralleling technique. This is an attempt to improve on the conventional bisecting method first described about forty years ago. In this technique the object-film distance is increased since the film is brought as nearly as possible parallel to the tooth. This in turn requires that the target-object distance is increased, in the majority of cases to a minimum of 16 in.

Two objections can be raised to this method: (1) The length of time required to carry it out, since positioning the film and the tube requires care and longer exposure is necessary; (2)

* This paper was prepared while the author held a Registrar appointment in the Periodontal Department of the Eastman Dental Hospital.

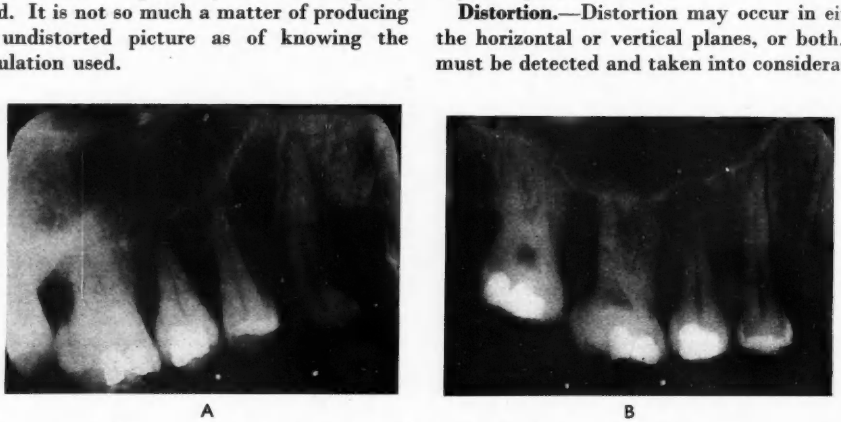
Often the apical portions of the roots are not included on the film—indeed, with a low palatal vault it may be a practical impossibility to overcome this difficulty and still use the technique.

In periodontology the paralleling technique has little application. It is agreed (Raper, 1953) that if as much care went into the production of films by the more conventional approach results probably would be equally good. It is not so much a matter of producing an undistorted picture as of knowing the angulation used.

film in the plane of the first or second premolars and increasing the target-object distance. The film can be stabilized by having the patient close the jaws so that it is held against the palate.

Regarding the type of film used, a greater range of density is obtained by using contrast films. The longer exposure time involved is useful also in that it allows of a more variable technique, so cutting down the risk of obliterating thin plates of bone.

Distortion.—Distortion may occur in either the horizontal or vertical planes, or both. It must be detected and taken into consideration



A B

Fig. 1.—A, Shows an apparent apical area on the $\underline{5|}$ which with reduced angulation (B), is seen to be in fact gross bone destruction. The tooth was vital. Note the altered level of the alveolar margin between A and B.

It is obvious that any technique other than a paralleling one will produce distortion to some extent, but this distortion can be considerably diminished by reducing the angulation generally advised. In the maxilla it is suggested that the periapical film, if used with an angulation of $+10°$ to $+15°$, will give very satisfactory results. One can say that a film produced with high angulation will be useless as regards the marginal alveolar area though of some value periapically, but that a film produced with low angulation giving a view of the interdental space is just as useful periapically. Indeed, the higher angulation may give a quite misleading picture (*Fig.* 1).

The mandibular alveolar margin seldom presents any great difficulty in the premolar and molar regions. However, in the anterior segment a narrow arch may be difficult. This can be overcome very often by placing the

before interpretation is attempted. Horizontally incorrect angulation results in overlapping of the teeth and a consequent obliteration to some extent of the interdental space. Vertically incorrect angulation produces either elongation or shortening of the teeth. It can often be detected by observing the bone margin, which will appear to approach and even pass the enamel-cement junction. Again obliteration of the interdental space occurs to some extent (*Fig.* 1, A).

THE LIMITATIONS AND VALUE OF PERIODONTAL RADIOGRAPHS

Limitations.—It is of the utmost importance to realize that radiographs are of limited value in certain respects. These should be fairly obvious, but they will be considered briefly in view of the number of inaccuracies in the literature.

1. *Limited Examination.*—For example, no information is obtained regarding the width of the periodontal membrane other than interproximally.

2. *Pocketing.*—No information is obtained regarding: (*a*) The level of the epithelial attachment; (*b*) Detachment of this epithelium, should downgrowth have occurred.

Pockets, therefore, cannot be seen on the radiograph, nor can the relationship of the pocket base to alveolar crest be determined. It is not just a matter of the radiolucency of soft tissues, since radiographs of saddle areas taken with a suitably reduced exposure time can carry a shadow of gingiva but no indication that pockets are present. It is unfortunate that one still reads about "the clear depiction of the depth of pockets" (on the radiograph).

3. *Calculus.*—While a calculous deposit, if sufficiently heavy, is capable of casting a shadow, this should not mean that reliance is placed on the radiograph when deciding on its presence or the thoroughness of its removal. When present in sufficient quantities to be radiopaque it should never be missed clinically. On the other hand, it is possible to have deposits present in so minute quantity that they could not possibly cast a shadow. They are, of course, still capable of causing irritation. Subgingival examination with a suitable instrument (Cross, 1953) is the only method which should be used for the detection of calculus.

4. *Mobility.*—The possibility of determining the mobility of teeth from radiographs is a common misconception. Such a discrepancy is found on occasions between the amount of bony support present around a tooth and the mobility it exhibits, that other factors must play an important part in determining the degree of looseness. These factors will include the pattern of bone loss, the surface area of the root, the amount of cancellous supporting bone, the width of the periodontal membrane, and the histology of the membrane.

5. *Reattachment.*—If complete regeneration of a portion of the alveolus with re-formation of the periodontal membrane in that area is implied, as can occur after apicectomy, it may be shown on the radiograph. It must be remembered, though, that apparent bone re-formation may in fact be condensation. However, connective tissue or epithelial reattachment obviously will not be visible, so that the clinical elimination of a pocket is possible without radiographic changes.

6. *Bifurcation Involvement.*—This will be referred to again, but it should be noted that especially in the upper jaw the radiograph can be very misleading.

Value of Radiographs.—At various times radiographs have been credited with usefulness in the prevention, diagnosis, treatment, prognosis, and follow-up of periodontal cases.

By prevention is actually meant that by using radiographs a diagnosis can be made in the very early stages of bone resorption. Minimal tissue destruction will have occurred and treatment should present no great difficulty. True prevention of periodontal disease is based on correct clinical procedures.

While it is possible to make a diagnosis of gingival disease from clinical examination alone, it is not possible to make a diagnosis of early marginal periodontitis without the radiograph (Goldman, 1942). This is due to the fact that one cannot from clinical examination of the gingivæ decide to what degree resorption has occurred in the underlying crest. There is no justification for assuming that fairly normal gingival colour and contour must be associated with normal underlying bone, nor for considering that gross abnormalities of colour and contour of the gingivæ must be associated with resorption of the underlying bone. In fact, a vigorous tissue response to irritation with hyperplasia is often a good prognostic sign, whereas to find gingivæ which have altered little from the normal with associated deep pocketing can be a poor one. Yet so often teeth are condemned on nothing more than a clinical inspection of the gingivæ. Martin (1939) has brought out this point when he says, "I am convinced that as a body we fail on two counts: (1) Failure to diagnose when pyorrhœa is present; (2) Failure in diagnosing pyorrhœa as present when it is not present".

It cannot, therefore, be stressed too much that in diagnosis a correlation of all methods of

examination is required. History, inspection, exploration for pocketing, examination of the occlusion, and radiographs all play a part, and danger lies in attaching more importance to any one method than is justified. Unfortunately, the radiograph has had a full measure of abuse in this respect, but it does provide a

Fig. 2.—Graduated silver points in situ. The variable relationship between pocket base and alveolar crest is well shown.

method of differentiating gingival disease from conditions where bone destruction is occurring, and in detecting abnormality of the supporting structures before there are clinical manifestations.

It is possible to enhance the value of radiographs by the insertion of radiopaque material into the pockets (*Fig.* 2). The silver points designed by Hirschfeld (1953) are particularly useful since they are calibrated, and can provide information regarding the depth of pocketing and the relationship of the pocket base to alveolar crest.

Radiographs do not play a significant part during the active stage of treatment since any points which have an application here should properly come into the diagnosis.

As regards prognosis, it is again a question of utilizing every possible method of examination. Teeth must not have their fate decided from the radiograph alone, though the degree of bone loss will obviously play an important part.

In follow-up, radiographs cannot as yet be fully exploited owing to the difficulty mentioned earlier of standardizing periodic examinations.

EXAMINATION AND INTERPRETATION

In this section we are concerned with the examination of the films so that any changes from the normal may be noted and interpreted. Three distinct steps are involved here, and while experience allows one to blend them together it is well to realize the process that is being followed. These steps are: getting to know the normal appearance; recognizing any alteration from the normal which has occurred; interpreting these changes in the light of knowledge gained from as many quarters as possible.

1. Getting to know the Normal Appearance.—For our purposes, we may consider that the alveolar process is made up of four components:—

Fig. 3.—The slope of the crest between the $\overline{76}$ parallels the line joining the enamel-cement junctions.

a. The cortical plates of the jaws.

b. The alveolar bone proper, on the radiograph the lamina dura.

c. The supporting bone which can vary considerably in amount and pattern between patients, between the jaws of any one patient, and in different areas of the same jaw.

d. The alveolar crest, its morphology depending upon the general bony development, the size of the interdental spaces, and the contour of the contiguous teeth.

Ritchey and Orban (1953) have drawn attention to an appearance of the crest, which,

although normal, is easily misinterpreted as being the result of disease. This is the alteration in the slope of the crest produced when a discrepancy exists between the relative heights of neighbouring enamel-cement junctions (*Fig.* 3).

Considerable variations are also found between patients in the relative lengths of anatomical crowns to roots, and also in the surface area of the roots as shown by their

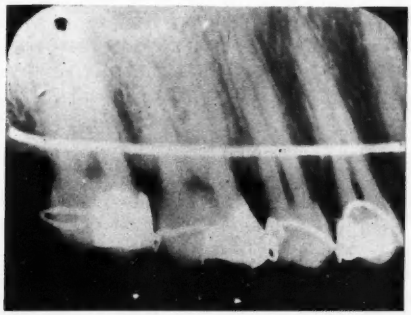


Fig. 4.—Wire placed along the mucogingival junction and gingival margin visualizes the relationship between these landmarks and the alveolar margin.

length and shape. These considerations may influence one regarding, for example, the diagnosis of occlusal trauma or the equilibration of stress by selective grinding. They also indicate that the loss of 6 mm. of bone support around one tooth may render the prognosis hopeless whereas around another it is, in itself, of little significance.

There are two aspects of periodontal anatomy which are of considerable importance in deciding the success of treatment in some cases. I refer to the variations met with in the depth of the attached gingiva on the vestibular aspect and in the relationship between mucogingival junction and bone margin. These can be visualized and recorded by placing a wire along the gingival margin and the mucogingival junction before the radiograph is carried out (*Fig.* 4). The wire may be carried by either a slip of cold-cure acrylic or wax. It is instructive to find the amount of soft tissue which often overlies the crest and how in some cases true pocketing must be quite extensive before bone is affected. It also shows just how ridiculous it is to quote any figure for pocket depth which would indicate the necessity for extraction.

One more point will be mentioned in this section, since again it often leads to misinterpretation. This is, that the margin of the alveolus does not approach closer than about 2 mm. to the enamel margin. This normal position for the bone margin is often erroneously considered to be due to resorption.

2. Recognizing Alteration from the Normal.—This requires a system of examination which will thoroughly cover the films. The actual procedure is a matter of personal preference. Examination of the teeth for areas of root resorption or caries is required. Regarding the bone, the overall pattern of loss should be noted first. Is it localized to one tooth, one or more groups of teeth, or generalized throughout the mouth? Equally important, is the bone in actual fact normal for the patient's age? Next, the individual interdental septa are examined for alteration of the crests, cancellous tissue, and lamina dura. Multirooted teeth require special note of the interradicular area. This examination should be extended to include the bone superimposed on the roots, since, despite the superimposition, a properly angulated and exposed radiograph can show changes here. Abnormal width of the line representing the periodontal membrane may be seen, but while its presence could be helpful, its absence simply means that there is no widening in that plane.

3. Interpretation. — Interpretation must always be carried out bearing in mind the age, sex, and occupation of the patient; also the fact that the radiographs are not taken with the teeth in occlusion, and therefore on occasions it is possible to fail to correlate neighbouring and antagonizing tooth relationships with the radiographic appearance. In this respect a bite-wing view using a periapical film has a possible advantage (*Fig.* 5).

It is unfortunately necessary at this stage to introduce the controversial question of classification of the diseases affecting the gingiva and supporting structures. Many have been attempted at one time or another, and it

is not considered for one moment that the one mentioned here is a solution to the problem. However, for the purposes of this paper it is felt that a primary division based on whether the condition is purely gingival or affects the supporting structures has certain advantages.

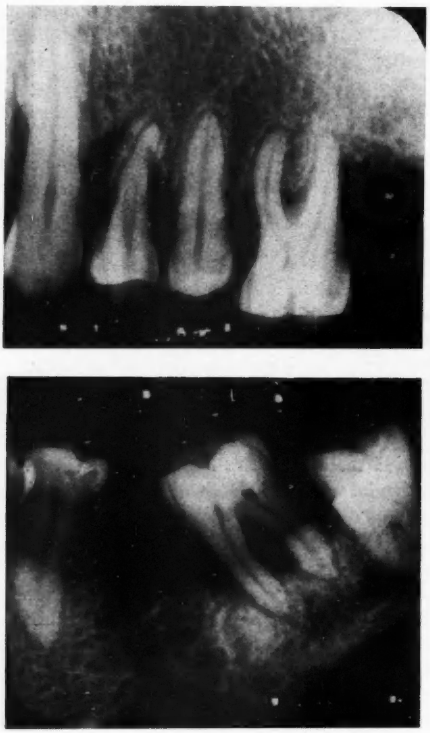


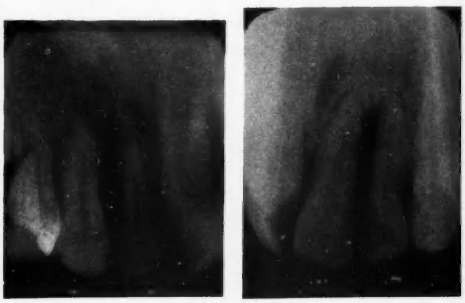
Fig. 5.—Shows a pattern of bone loss which can develop by the extraction and non-replacement of teeth.

Many teeth have been needlessly sacrificed for want of appreciating that we are concerned with two organs in the periodontal system, and that it is possible to have gingival disease, disease confined to the supporting structures, and, by virtue of their juxtaposition, disease affecting both.

Bone loss on radiograph may result from a number of causes though there is still disagreement as to their relative importance.

It may be an age change when reduction in height of the alveolus occurs as atrophy in an otherwise healthy mouth, and some degree of gingival recession may occur. Gingivitis may be present as a separate condition, playing no part as an aetiological factor in the bone loss. If pocketing is present the degree of atrophy must be allowed for when assessing the bone loss.

It occurs when gingival inflammation progresses into the underlying structures. It must be remembered, however, that as much as 6 mm. of gingival tissue may lie marginal to the alveolar crest so that clinically cases can be seen where, with normal gingival contour,



A B

Fig. 6.—**A**, Resorption has produced a concave crest between the $\underline{32}|$; **B**, Note the widened intraseptal canal between the $|\underline{12}$.

pocketing of 5 mm. is present with apparently little or no bone destruction.

The earliest radiographic change seen when a chronic gingivitis goes to a chronic marginal periodontitis occurs at the tip of the interdental septa (Weinmann, 1941). Resorption first produces flattening and then possibly the formation of a concavity. In turn the lamina dura is lost, the related portion of the periodontal membrane ceasing to exist as such. Apical to this area a widened intraseptal canal is often seen (*Fig.* 6).

One area requiring special note is that which lies between the two most distal standing teeth in the maxilla. Here the more distal tooth is often thrust distally on occlusion of the teeth, so that opening contact and food impaction occurs. As a result, a complaint of

vague pain around this region is often encountered, and on examination caries and pocketing are found. Technical difficulties often result in a poor radiograph of this region so that the condition is often missed (*Figs.* 7, 8).

Fig. 7.—Three examples of bone destruction between the last two standing teeth, with caries in the third illustration.

When pocketing spirals around the root an unusual appearance may be seen (*Fig.* 9).

Increased radiolucency of the crest can occur apart from actual decrease in height. It is variable in extent and more marked in areas where the alveolar process is broad. It has been used (Miller and Pelzer, 1939) as a basis for a radiographic classification of marginal periodontitis. Broadly, it has been considered that the more rapid the bone destruction the wider is this radiolucent zone owing to resorption of the cancellous tissue to varying depths.

However, it is possible to obtain the same appearance by altered morphology of the crest only. This alteration may be in the form of a concavity or a slope towards the vestibular or lingual side. One difficulty in accepting

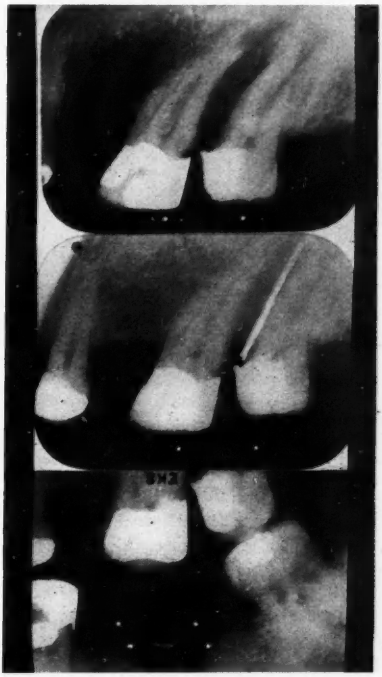


Fig. 8.—These three radiographs show the necessity for careful clinical examination where superimposition of palatal bone may prevent the diagnosis of bone loss from the routine radiograph.

rarefaction of the cancellous tissue is that the depth of this zone can be altered by a change of angulation. In the maxilla, as the tube approaches the horizontal and then assumes a negative angle, the radiolucence in some cases can be made to disappear. In others it persists as a narrow area, explained by the presence of a concave crest with a thin bony rim (*Fig.* 10). The reverse holds true for the mandible (*Fig.* 11). In practice, it would appear that a slope towards the palatal is the more common change in the maxilla since seldom, if ever, will decreasing angulation produce a broader

radiolucent zone. A slope towards the lingual is again the more common change in the mandible. It would seem, then, that the rate of resorption cannot be assessed from the radiograph, especially when it is remembered that there is a considerable lag between resorption and radiographic change.

Fig. 9.—The radiolucent area on the mesial of the canine was due to a spiral pocket starting on the lingual aspect.

points are used. Recently Morris (1953) has shown that the deepest part of the majority of pockets is about midway between the buccal and lingual. Also, from the midpoint lingually the pocket becomes only slightly shallower in many cases. It would seem then that a lingual gingivectomy alone is more desirable than a buccal one alone, on the basis of pocket and bone outline. Generally, though, it is not necessary to make a choice between one or the other except in those cases where the gingival depth makes buccal gingivectomy difficult.

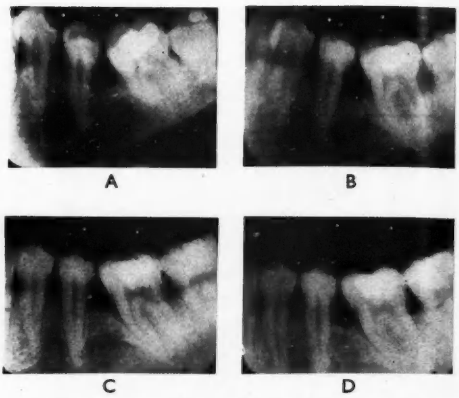


Fig. 11.—A, Appearance with conventional angulation; B, Appearance with angulation of —10°; C, Appearance with zero angulation; D, Appearance with angulation of +10°.

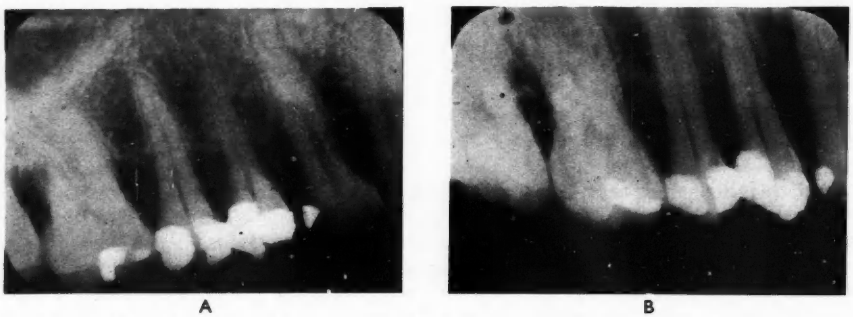


Fig. 10.—A, Shows the radiographic appearance of the alveolar crest using the conventional angulation; B, The appearance with the tube angulated at —15°.

This palatal or lingual slope has a practical application. Too often one finds that gingivectomy has been carried out on one aspect only, the vestibular, thus leaving lingual gingiva to be traumatized when interdental

The only other point to be mentioned here concerns bifurcation involvement. Clinical

examination should detect the presence and extent of pocketing in bifurcations or trifurcations. The radiographs can be misleading in that increased radiolucence may only indicate involvement from one aspect only, more often the lingual. The radiolucence is due to a thinning of the crest as has been described for the interdental septum.

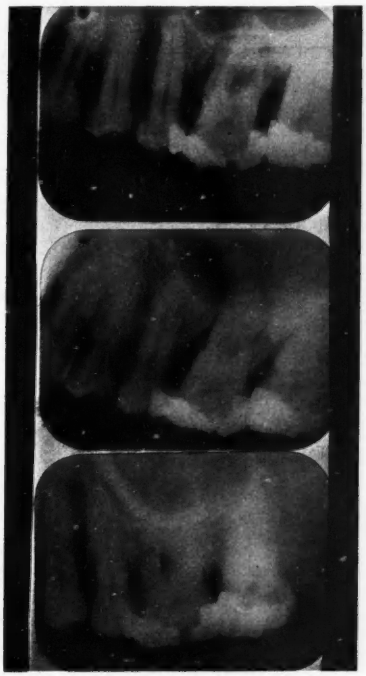


Fig. 12.—By directing the tube distally the bone loss in the trifurcation of $\underline{6}|$ becomes obvious.

In trifurcation it is possible to miss bone loss entirely if the palatal root is heavy and fills in on the film the interval between the buccal roots (*Fig.* 12).

Fig. 13 shows the localized destruction produced by the formation of a periodontal abscess.

A degenerative condition, periodontosis, is considered by some authors to have been established as an entity. Others do not feel that this is justified on the evidence available. In the Report of Evaluating Committee I of the Michigan Workshop (1952) Ramfjord stated that "from present knowledge it is not unequivocally established that periodontosis is a disease entity of pure degenerative nature discernedly different from periodontitis".

There is no doubt that many cases diagnosed as periodontosis, especially in adults, are in fact cases of breakdown from occlusal overload or other cause, but there is also no doubt that rare cases are seen where the distribution and extent of bone loss and the age of the patient differ from the vast majority of cases

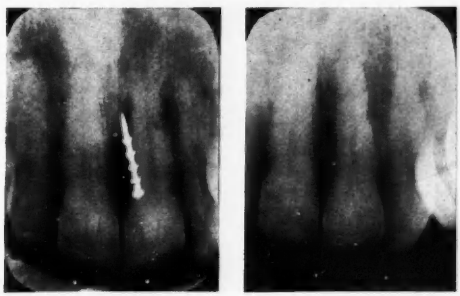


Fig. 13.—The appearance of a periodontal abscess before treatment and after curettage. (With acknowledgements to Mr. W. G. Cross.)

so markedly that a diagnosis of periodontosis seems justified. On the radiograph localized destruction is seen affecting the first molars and the incisors to a varying extent. Only one root of a molar may be affected. Unfortunately pocketing is generally present by the time the case is seen, so that it is virtually impossible to decide to what extent infection has played a part in the bone destruction.

Since periodontosis is generally considered to have a systemic background, confusion has arisen as it is possible to have a chronic marginal periodontitis of purely local aetiology present in a patient with a definite systemic disease of a type which can modify the rate of bone destruction. The radiographic appearance in this case is not of the periodontosis pattern even when the bone loss is advanced.

Bone loss also occurs when chronic traumatic injury is transmitted to the supporting structures via the tooth. This is a point on which there is disagreement, but when cases

repeatedly present a clinical picture and radiographic changes in very close agreement it is justifiable to postulate cause and effect. It has been denied that trauma can produce bone resorption unless marginal inflammation is present. In other words, one can never see on the radiograph loss of bone in an area which clinically has normal gingiva. This is a fallacy. It may have arisen from the fact that

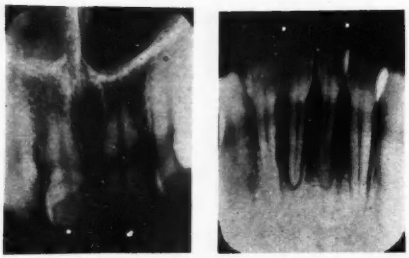


Fig. 14.—Note the widened periodontal membranes around the $\underline{1}$ and the $\overline{1}$ in a patient with a grinding habit on these teeth.

this type of bone loss has a quite unpredictable distribution, occurring often on the lingual or buccal aspect where superimposition renders detection difficult. Trauma can be an irritant in the same way as calculus, overhanging fillings, or bacteria, and a variable tissue reaction is just as possible. Cases are seen where subgingival calculus of long standing has produced gingival enlargement rather than periodontal destruction.

In the case of a tooth with a normal gingiva, it is extremely difficult to decide clinically whether or not that tooth is receiving stress in excess of the physiological limit of the supporting structures. In practice one has to turn to the radiograph in order to decide whether early destruction or compensation is taking place. It must be remembered that a tooth may be stressed in such a direction that early radiographic change is not detectable.

Compensation may show as an increase in periodontal membrane width or as increased density of the alveolar bone (*Fig.* 14). The widening may be generalized around a root or confined to one aspect.

Bone loss may, however, be seen. It can occur on any aspect of the tooth and when uncomplicated is seen as a sharply demarcated area (*Fig.* 15).

As in the case of senile atrophy the marginal gingiva may undergo recession, or inflammation, which may be in no way contributing to the bone loss. Should epithelial downgrowth and pocketing commence we have already present a very important modifying factor on the type of pocket formed. It may spiral around the root, becoming intra-bony as it does so. It may be narrow and localized to one aspect. With multirooted teeth it may spiral into the birfurcation or trifurcation and give rise to a deep periodontal abscess. This is commonly seen when a maxillary molar is in heavy balancing contact. Destruction around the palatal root occurs with pocketing localized to this region.

It is worth noting that in many of these cases with localized destruction the tooth is in no danger from lack of support and if the bone loss can be halted we have a tooth still quite capable of withstanding normal stress without splinting.

One tooth which is commonly seen to have suffered from bone loss due to occlusal stress

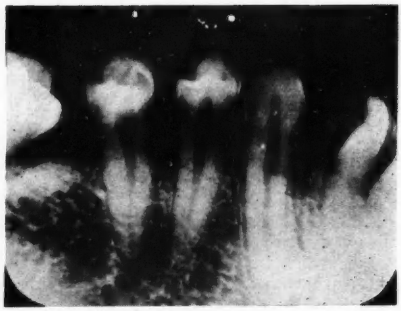


Fig. 15.—There is a well-defined area of bone loss on the mesiolingual aspect of the $\overline{5}$.

is the maxillary central incisor. This may be the only area in the mouth showing advanced bone loss. Unfortunately treatment is often sought only when the tooth is migrating, or when an abscess has developed (*Fig.* 16). In other words pocketing has become superimposed with, more often than not, the base of the pocket intra-bony.

Apart from gross bone loss, increased radiolucency of the cancellous tissue, root resorption, and pulp death with apical rarefaction may also indicate occlusal trauma (*Fig.* 17).

Often it is possible to find two or more of the above changes around a single tooth. For example, bone loss and apical widening of the membrane are often seen.

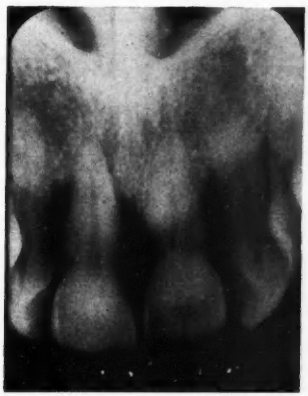


Fig. 16.—Bone loss due to excessive occlusal stress showing migration of the maxillary right central incisor.

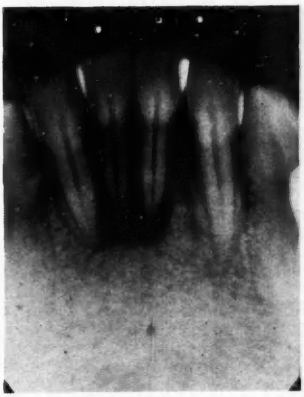


Fig. 17.—Periapical radiolucency associated with occlusal overload.

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Chondrosarcoma of the Jaw

An interesting case of chondrosarcoma of the jaw has been reported in which no conclusive radiological evidence was forthcoming in the early days of the disease. Eight years later a biopsy was done as the tumour had grown and had involved the buccal and lingual surfaces of the mandible, stretching the oral mucosa. As chondrosarcoma was diagnosed, part of the jaw was removed. Four months later a bone-graft was carried out and the patient survived for six and a half years. As severe pain developed in the back a laminectomy was performed and a metastasis of the chondrosarcoma of the vertebræ found. The patient died three months later with metastases in the lumbar spine, right sixth rib, and lungs. —(*Ann. R. Coll. Surg. Engl.*, 1954, **14**, 208.)

DENTAL BOARD OF THE UNITED KINGDOM

Chairman's Address at the Opening of the Sixty-seventh Session
November 10, 1954

GENTLEMEN,

In July of this year, the term of office of more than half of our members came to an end. It is therefore particularly pleasing on this occasion to observe that there is no change among the faces which we see around us. The confidence which the Minister of Health clearly reposes in Mr. Michaels, the Secretary of State for Scotland in Mr. Vallance, and His Excellency the Governor of Northern Ireland in Mr. Shuttleworth is commensurate with our desire that they should continue their admirable service among us, while the General Medical Council have reaffirmed the wisdom of their own past decision to give us of their best by returning Professor Brocklehurst, Sir Sydney Smith, and Mr. Stoney. The Privy Council have also seen fit to reappoint your Chairman. We can therefore look forward to resuming our deliberations without the necessity of having to bring new members into the picture.

We are not, however, the only ones to be congratulated. I recently had an opportunity of visiting Edinburgh and seeing their Hospital and School which has been completely transformed by a most extensive rebuilding programme and re-equipped on a lavish scale. The Director and his colleagues have collaborated with the architect to produce a building of which the capital city of Scotland may well be proud and which incorporates the most recent advances in hospital construction as well as housing the most modern equipment. It is difficult to over-estimate the value of such ambitious and well-considered provision for our students in encouraging the entry of further recruits to our profession. The new building is not only one of which the City and the staff may be proud but it will be shown by students with genuine enthusiasm to their younger friends who may not yet have decided on their future career.

I wish to refer once again to this subject which is of such cardinal importance to the profession and ultimately to the nation—I mean the shortage of suitable candidates for a career in dentistry. It is an extraordinary thing that in a country so conscious of the importance and value of positive health as is our own we should nevertheless be short of dentists. I can only believe that the enormous changes that have taken place in the evolution of dentistry in the last quarter of a century may have been overlooked by careers masters and mistresses in our schools. Dental education has developed in these years from a haphazard technical training to one of the most severe scientific disciplines in our universities. Opportunities for research or for an academic career in dentistry are at least as great as in any other branch of applied science: for those who prefer the satisfactions of a profession to those of commerce the interest and rewards of dental practice, whether as general practitioner or consultant, compare favourably with those of other callings, while there are few, if any, professions which offer a greater immediate reward to the newly-qualified or more financial security than does ours. The nation is becoming increasingly tooth-conscious and dentists are certain to be in short supply for the next generation at least. Meanwhile we may recall that the statutory power of the Board to raise money from the profession and apply it for the benefit of dentistry was given to them mainly to enable them to encourage young people to enter the profession. This they did in the period between the wars by awarding bursaries to students. They also sought to raise the whole standard of dentistry, and so make it more attractive, by means of grants for the improvement of dental schools, and by contributing to the cost of founding chairs and other teaching posts and supporting research. Responsibility for such bursaries and grants has now been transferred to the Government and Local Education Authorities while the amount of the annual retention fee imposed by the Board is substantially less than it was before the war. Nevertheless the responsibility remains—a responsibility laid down at the instigation of the profession itself—to do what we can to stimulate entry into the profession, and at the last session of the Board it will be remembered that we set up a special committee for the purpose of considering any means by which the Board might assist in improving recruitment. The members of this committee have met on two occasions and their report will be laid before you at this session.

Several of us here to-day were among those who between 1950 and 1952 advised the General Medical Council concerning the minimum requirements for a certificate of fitness to practise. The Recommendations of the Council are published and it would be difficult to defend a contention that the four-year minimum course prescribed was less than adequate for securing that those who take it are competent to practise dentistry on the public without supervision. It is appreciably longer than the minimum course for a degree in Arts, Science, Law, or Engineering. Nevertheless, dental education serves other purposes than to train men and women for general practice. We must educate the future teachers in dentistry, research workers, consultants, administrators, and even produce dentally qualified teachers in the basic sciences. The universities have been quick to recognize that for these specialized activities men and women need a longer and more strenuous course of training than the prescribed minimum, and many of the schools have been eager to supply the need. At the same time it is both in their interest as well as in that of the profession and the public, that these same schools should fill up any vacancies in their list of entries with men and women who are willing or able to take only the minimum course prescribed by the General Medical Council; and I believe it to be the duty of every school that is not full up at this stage in our social evolution to provide such a course and welcome students who wish to take it.

I have now to refer to another, and quite different, matter. The Departmental Committee of 1917–19, after most careful and cogent argument recommended that, despite the "gross abuses" which had been associated with the practice of dentistry by incorporated companies, such companies should not be prohibited from practising dentistry, but should be controlled by the requirement that all the operating and managing staff be registered dentists. The Act which gave effect to the Committee's

recommendations provided, however, that not all, but a majority, of the directors of such companies should be registered dentists. This enactment has in practice resulted in the removal of any company which has a lay director from the effective control of the bodies, that is the Dental Board and the General Medical Council, which were otherwise to be responsible for the maintenance of high standards of professional conduct in dentistry.

To-day, more than half the companies which carry on the business of dentistry come into this category. Many of them appear to be purely family concerns in which the lay director is a relative of one of the dental directors and there is no evidence to show that these do not conduct their affairs in accordance with the ethical standards which the profession demands and which the public is entitled to expect. Among the remainder, however, there are some of which the only permanent feature of the controlling board seems to be the continuance in office of the lay director. In these companies the constant substitution of one dentist for another as director finds its parallel in the constant substitution of one dentist for another on the operating staff, the changes in both cases often occurring several times in a year. With others it has been found that the dentists whose names have for years been entered in the Companies' Register as directors have had no idea that they were in fact connected with the company and had no knowledge whatever of the companies' affairs. The Board have information indicating that in certain cases, where a company is virtually controlled by a layman and dental directors are appointed in name only, merely to satisfy the provisions of the Dentists Acts, the ethical conduct of the business is subordinated to the profit motive. In view of the falling entry to our profession it may be worth recalling that the Inter-Departmental Committee on Dentistry, in their Final Report published in 1946, associated themselves with the opinion that " any commercialization of a branch of the healing art must necessarily result in the loss to the profession of the best type of entrants and so lead to a deterioration of the value of the service given to the public".

There is another serious consideration: it is difficult to see how a body corporate set up to carry on a dental practice can conscientiously limit its legal liability, as some have done, to a mere hundred pounds. Avoidance of financial liability for injury was one of the main indictments brought against such companies before the Departmental Committee nearly forty years ago and it is disconcerting to find that the evil still exists.

I therefore feel it is my duty to draw the attention of any dentist who may carelessly have allowed his name to be entered as a director of a company without ensuring that the practice of the company is ethically conducted, to the relevant paragraph of the Warning Notice issued by the Board in which it is declared that:—"Any registered dentist who becomes a director of a body corporate carrying on the business of dentistry thereby accepts responsibility for the maintenance of a high standard of professional conduct in that practice or business and may be required to answer to the Board for any act or omission in the conduct of that practice or business which appears to the Board to be such as would, if attributed to a registered dentist, constitute infamous or disgraceful conduct in a professional respect."

In conclusion, you will be interested to hear that a notice has been received from the Minister of Housing and Local Government to the effect that this building has been included in the list of buildings of special architectural or historic interest in this area. In an explanatory note it is stated that the Minister has been advised by a committee of experts in architecture, history, and archæology. I have an affection, which arises from pleasant associations, for this building, an affection which I am sure you all share, and I am glad to have that appreciation shared by the Minister's expert advisers. Lest their approval should engender an attitude of complacency, however, I must add that the effect of inclusion in the Minister's list appears to be merely that two months' notice must be given before the building is demolished. This seems to be a wholly desirable provision: my only regret is that it was not in force in 1940.

I fear that the brevity of my Address on this occasion may not be matched by that of the disciplinary business before the Board and I hope you will all be prepared to sit until Friday evening if necessary.

NATIONAL HEALTH SERVICE NOTES

Hospital Medical and Dental Staff

A NEW Ministry of Health memorandum, H.M. (54) 98, together with M.D.B. Circular No. 18, has been issued which sets out certain revised arrangements, agreed on Committee B of the Medical Whitley Council, for the remuneration and terms and conditions of service of hospital medical and dental staff. These revised arrangements affect the annual and sick leave schemes, and the position of locums.

Hospital Dental Service

A NEW memorandum in book form, H.M. (54) 94, has been issued by the Ministry of Health, which consolidates and supersedes, with a few minor modifications, the following memoranda:—

R.H.B.	H.M.C.	B.G.	
(48)43	(48)29	(48)27	
(49)59	(49)47	(49)50	
(51)34	(51)32	(51)32	paras. 1–8 (in part)
			paras. 9 and 10.
(52)52	(52)48	(52)51	
(52)73	(52)66	(52)70	
(52)75	(52)68	(52)72	

It deals in detail with all matters which affect dental staff in particular in the Hospital Dental Service—supply and repair of dentures and appliances in hospital; charges; arrangements for treatment; fees and remuneration.

SOCIETY NOTES

INSTITUTE OF BRITISH SURGICAL TECHNICIANS (INC.)

Dental Section

North-west Region.—The first lecture of the season was held in the Turner Dental School, Manchester, on Thursday, Oct. 14, 1954, when Mr. H. D. Penney, F.D.S. R.C.S., Senior Hospital Dental Officer at the Maxillo-Facial Unit, Wythenshawe Hospital, Manchester, dealt with the subject of "Intra-oral Prosthesis in the correction of Facial Deformities".

Mr. Penney commenced by stating that the cases he would refer to had all been treated at the Maxillo-Facial Unit at Wythenshawe and were the result of close co-operation between the dental team and the plastic surgeons. There was extra satisfaction from treating these cases because the improvement in facial contour was followed by much improvement in the patients' general outlook and bearing.

With the aid of projected slides a description was given of the treatment and appliances used in various cases, the first being a war casualty with gross loss of maxilla and nasal bones, then typical saddle-nose cases. These were all treated with epithelial inlays, an incision being made in the labial sulcus of the upper jaw and the tissue in the nasal area freed from the facial bones. Into this subnasal cavity soft compo was moulded until the tissue was over-distended, this being necessary because of the tendency of the skin-graft to shrink. The mould was removed, covered with skin taken from a hair-free area on the arm or leg and returned to the subnasal cavity created. After a few days the mould was removed for cleaning and to check that the graft had taken, and re-inserted. As soon as possible the compo mould was replaced by an acrylic copy. Over a period of weeks several moulds were made, each one being a little smaller than the previous one, until the nasal area assumed a good shape. To support the mould a splint was made previously which had an oval stud situated in the region of the mould. On this stud a platform with an oval tube attached was slid under the mould and held in position by a 6 B.A. screw. In the event of the patient being edentulous a Gunning splint was made which might be alveolar wired to the jaw, supported by springs, or Kingsley bows to a headcap.

Mr. Penney then described cases where there was a lack of growth of mandible with a resultant lack of chin. One of these had had an onlay bone-graft in the anterior region of the mandible and later an epithelial inlay in the labial pouch. Eventually a prosthesis was made covering the original mandible, the bone-graft, and carrying a large mould which sat in the labial pouch. This prosthesis was very stable and brought the chin to a normal position.

The last cases described were adult repaired hare-lip and cleft palates. With these cases Mr. Penney intimated that there was generally a collapsed arch and the upper lip bound to the premaxilla had little mobility and was very flat. An epithelial inlay was made in the upper sulcus, supported as described previously. Finally a prosthesis was made covering in some cases all standing teeth, which brought the lip to a reasonable position.

CITY OF LONDON COLLEGE

Moorgate, London, E.C.2

(*Patron*: H.R.H. THE DUKE OF EDINBURGH)

Travers Memorial Lectures

FIVE special lectures on "Professional Negligence" will be delivered by Mr. J. P. Eddy, Q.C., on Wednesdays at 5.30 p.m., from Jan. 12 to Feb. 9, 1955.

Professional negligence is a subject of wide interest in view of the number of cases coming before the courts in which claims for damages for negligence are made against professional men or their employers. In this series of lectures Mr. J. P. Eddy, Q.C. will review leading cases, and the principles upon which they have been based, in order to explain the present state of the law to professional men and administrators.

Jan. 12: General Principles of the Law of Negligence.

Jan. 19: The Law and the Lawyers.

Jan. 26: The Liability of Bankers, Accountants, and Company Secretaries.

Feb. 2: The Liability of Doctors, Hospitals, and Dentists.

Feb. 9: The Liability of Members of Other Professional Bodies, and Summing-up.

The course is intended for qualified professional men and women, and for administrators responsible for the provision of professional services. Tea will be available from 5 p.m. Lectures will commence at 5.30 p.m.

Fee for the course, or any part thereof, £1 11s. 6d., to be sent to the Secretary of the College to arrive not later than Jan. 5, 1955. If the course is full, enrolment may cease before that date.

BOOK REVIEW

LEHRGANG DER GEBISSREGELUNG (Vol. II, Die Behandlung). By Professor Dr. A. MARTIN SCHWARZ, Vienna. 9 × 6½ in. Pp. 987 + viii, with 572 illustrations. 1953. Wien and Innsbruck: Urban & Schwarzberg. D.M. 98.

THE recently published second volume of Schwarz's comprehensive work on orthodontics is devoted to the treatment of malocclusion. Although the author is best known for his work with the biomechanical appliance which now bears his name in general usage, he has obviously set out to produce a detailed manual of all modern therapeutic methods.

After an opening chapter on the biological and mechanical aspects of tooth movement and tooth extraction, and a short historical review of the subject, the evolution of modern orthodontic thought is traced from Angle and his earliest expansion arch to the most recent functional aids.

In the realm of fixed apparatus, precise descriptions are given of the techniques and applications of the original Angle arch and its successors, the ribbon and edgewise arches, Johnson's twin-wire arch, and the Mershon-Lourie labiolingual method. In keeping with the rest of the book, these chapters are freely illustrated, with a wealth of technical detail. Step-by-step instructions are given in appliance construction and activation. A number of treated cases are shown in connexion with every apparatus, demonstrating the particular merits and indications of each.

The reasons, mechanical, biological, and economic, are then outlined for the author's leaning, in later years, towards the removable appliance. Special reference is made, in this connexion, to the researches of Ketcham, Oppenheimer, Gottlieb, Orban, Reitan, Häupl, and Eschler on the histopathology of orthodontic movement.

Construction and application of the "active plates" of Nord and Schwarz is covered in greater detail than in any previous publication. The literature on the Andresen activator is similarly brought up to date by the inclusion of the recent advances of Häupl, Petrik, Grude, and Eschler. Space is also given to the modern developments in the functional field, notably the split activator, the Bimler appliance, the propulsor, and an active soft-rubber appliance developed from Kessling's final positioner.

The author outlines an interesting theory on the stimulation of the pituitary as a result of expansion of underdeveloped maxillary arches, with improvements in the physical and mental development of the patients concerned.

Treatment by extraction is very thoroughly covered and some case records are shown of severe dentofacial abnormalities corrected by surgery.

In a work of this calibre (almost 1000 pages and over 570 excellent illustrations) one would have liked to find wider reference to the work on abnormal muscular function carried out in this country by Rix, Ballard, Tulley, and others. More space might also have been given to preventive measures and to the myofunctional exercises as outlined by Rogers. On the purely technical side it seems surprising that the welding of stainless steel is not covered in fuller detail. This surely is an essential of any modern text-book.

There is no doubt, however, that as a work of reference and instruction this book will prove of great value to teacher, specialist, and general practitioner alike. H. L. E.

Fatal Hæmorrhage following Regional Anæsthesia for Operative Dentistry in a Hæmophiliac

A case has been described where a patient was given two inferior alveolar nerve-block injections to prevent pain in cavity preparation. In spite of the fact that the patient admitted numbness of the lip, he still complained of pain when cavity preparation was attempted. The appointment was terminated as the dentist did not want to give a third injection.

A gradually increasing swelling of the oral tissues during the next four hours prompted the patient to call his dentist, who advised him to apply cold to his swollen face. The next day the swelling continued to increase and the patient could not swallow, so he was referred by the dentist to the family physician, who gave him a prescription—contents unknown. The patient's condition became steadily worse and his physician sent him to the hospital, where a provisional diagnosis of hæmophilia, ecchymosis of pharynx, mouth, gingiva, face, and neck was made. The chief complaint was swelling of the jaw, mouth, and neck. Two days later the patient developed acute respiratory distress. The same evening circulatory failure with cessation of heart-beat was pronounced and the patient died.

In a hæmophiliac the question of tracheotomy becomes a highly complex one. When absolutely necessary to prevent death from asphyxia, tracheotomy should be performed, and the subsequent bleeding controlled by whole blood transfusions, etc.

In the anatomical discussion of this hæmorrhage, the following points are brought out:—

The logical site for such a hæmorrhage to occur, due to trauma of a blood-vessel while making an inferior alveolar nerve injection, is in the pterygomandibular space, where the inferior alveolar nerve and the lingual nerve lie. Also traversing this space are several arteries of moderate size, such as the inferior dental, mylohyoid, lingual branch, and the first division of the internal maxillary. In addition, there are also the corresponding veins which accompany the arteries. The blood from this pterygomandibular space would find exit in three different ways: (1) in the buccal space; (2) into the submucosa of the oral vestibule; (3) into the lateral pharyngeal space; and may also find its way, subsequently, to the submandibular space. It is believed that the pressure caused by blood filling these spaces in the neck led to the collapse of the pharynx. This pharyngeal collapse caused blockage of the air-passage, and death ensued.

Surgical or anæsthetic procedures should not be attempted in a patient with uncontrolled hæmophilia.—ARCHER, W. H., and ZUBROW, H. J. (1954), *Oral Surg.*, 7, 464.

ABSTRACTS *from Other Journals*

The Diet and Mastication: Their Effects on Diffusion and on Inception of Dental Caries

Rates of diffusion of sugar and acid both in and out of a space similar to that of an occlusal fissure or an interproximal area were studied experimentally. It was concluded that:—

1. Muscular activity would increase the rate of diffusion both in and out, and that vigorous activity over a short period would be more effective than a prolonged weaker type.

2. The concentration reached in the space depended on the concentration outside and the period of exposure.

3. If the space was blocked by absorbant food material the diffusion rates would be greatly reduced, but a buffer solution outside the blockage would still be effective to a certain extent.

4. Saliva is as effective a buffering agent as a phosphate buffer of the same titre.

5. Food which contained acid would considerably decrease the outward rate of diffusion from the space.—NEVIN, R. B., B.D.S., B.Sc., A.N.Z.I.C., University of Atago Dental School, Dunedin.